

**CASE No. 2021-00127**  
**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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1. Refer to Rhudes Creek Solar's Site Assessment Report (SAR), Attachment 19, Inverter Noise Profile Diagram. In the southwest corner of grid reference D3, there is a dwelling depicted as approximately 130 meters, or 427 feet, from the nearest inverter. In the center of grid reference D7, there is a dwelling depicted approximately 100 meters, or 328 feet, from the nearest inverter and 160 meters, or 525 feet, from the next nearest inverter. Refer to the SAR Section 4, Anticipated Noise Levels, page 10, where it states, "[T]he closest three adjoining residential dwellings are at 417, 830, and 879 feet away." Explain this conflicting information. If it will be addressed by the forthcoming noise study, reference may be made to that document with specific designation to where it is explained in the study.

**Response: For purposes of the noise impact analysis, adjoining residential dwellings were defined as dwellings on neighboring, non-participating properties and excludes all dwellings on properties leased by the participating landowners. Therefore, the closest adjoining residential dwelling is the aforementioned dwelling in grid reference D3. The analysis did not consider the dwelling owned by the participating landowner located in grid reference D7.**

**Witness: Jeff Chang, Planning & Engineering Manager**

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2. Refer to the SAR, Attachment 7, Glare Analysis. The analysis appears to find some amount of green and yellow glare produced by the proposed project's solar panels. Provide a written summary of the findings of the Glare Analysis, including whether and to what extent local residents or drivers on local roads would be impacted by glare as well as how the results of the glare analysis affect the development plan for the proposed project and any possible mitigation.

**Response: In the study results, glare is represented as green or yellow. Green glare is relatively mild, with low potential to cause a visual afterimage. Yellow glare has a moderate potential for afterimage. There is glare predicted primarily during morning and evening hours due to the low angle of the sun on the horizon. The glare study does not consider obstructions that reduce glare to points of interest. For mitigation, the Project has been planned with landscaping and natural elevation contours to obstruct the lines of vision between panels and residential dwellings and roadways. Lastly, there is also another category of glare known as red glare, which is dangerous and has serious potential to cause retinal burning and permanent eye damage. However, no red glare is predicted for the Rhudes Creek Solar project.**

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3. Refer to the SAR Section 5, Effect on Road, Railways, and Fugitive Dust, page 12, where it states, "There will be up to 150 construction employees and parking will be onsite." Also, refer to Rhudes Creek Solar's responses to Siting Board's First Request for Information, page 6, where it states, "Employees arriving to the site will carpool, likely in 5 or 6 vans per day for pickup and delivery." Clarify if employees will most often drive their own vehicles, carpool together in vans, or a mix of modes. Also, describe any incentives or other measures that would be used to encourage carpooling or discourage single-occupant vehicles during construction.

**Response: Employees' transportation to the site will be a mix of modes, with most entry-level workers and temporary laborers carpooling each day via the subcontractor-provided vanpool. The remaining contractors will arrive via personal vehicle or contractor assigned work truck. Personal cars and work trucks will also consistently carpool a full vehicle's worth of employees. Contractors are incentivized to have their employees carpooled to the site by only being permitted a limited number of on-site parking spots**

**Witness: Alexander Gregory – Sr Manager EPC**

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4. Refer to the SAR Section 1, page 3, where it states, "If water service is required during construction or operation, the Project is within the Hardin County Water District #2 service territory." Also, refer to the SAR Section 5, page 13, where it states, "A number of dust mitigation measures will be employed to minimize fugitive dust emissions. These include, but are not limited to:

- Retaining natural windbreaks and barriers
- Frequent water applications to wet surfaces and prevent fugitive dust
- Reduced speed on site and control of vehicle access
- Washing equipment prior to leaving the site
- Covering open trucks
- Using gravel compacted roads for construction and maintenance

Explain to what extent Rhudes Creek Solar expects to use on-site groundwater wells or contracted water service from Hardin County Water District #2 as its primary source of water supply for dust mitigation during construction.

**Response: Rhudes Creek Solar anticipates on-site construction to be a mix of on-site and contracted water service, with the main supply being sourced on site and Hardin County Water District 2 service supplementing as needed.**

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5. Refer to the SAR Section 5, page12, regarding impacts on railways, where it states, "Omega Rail Management has provided clear instructions and requirements for safety and operating procedures during construction." Provide a copy of those instructions and requirements.

**Response: Please see the attached CE-8 REV 3-97 Specifications for Pipeline Occupancy of Railroad Property.**

**Witness: Jeff Chang, Planning & Engineering Manager**

**SPECIFICATIONS  
FOR  
PIPELINE OCCUPANCY  
OF  
RAILROAD  
PROPERTY**

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## 1.0 GENERAL

### 1.1 Scope

a. This specification shall apply to the design and construction of pipelines carrying flammable or non-flammable substances and casings containing wires and cables across and along Railroad property and facilities. This specification shall also apply to tracks owned by others (sidings, industry tracks, etc.) over which Railroad operates its equipment.

b. It is to be clearly understood that Railroad owns its right-of-way for the primary purpose of operating a Railroad. All occupancies shall therefore be designed and constructed so that rail operations and facilities are not interfered with, interrupted or endangered. In addition, the proposed facility shall be located to minimize encumbrance to the right-of-way so that the Railroad will have unrestricted use of its property for current and future operations.

### 1.2 Definitions

- |    |                       |   |  |
|----|-----------------------|---|--|
| a. | Railroad              | - |  |
| b. | Chief Engineer        | - | Railroad's Roadmaster or his designated representative.                          |
| c. | Owner (Applicant)     | - | Individual, corporation or municipality desiring occupancy of Railroad property. |
| d. | Professional Engineer | - | Engineer licensed in the state where the facilities are to be constructed.       |
| e. | Carrier Pipe          | - | Pipe used to transport the product.  |
| f. | Casing Pipe           | - | Pipe through which the carrier pipe is installed.                                |

### 1.3 Application for Occupancy

a. Individuals, corporations or municipalities desiring occupancy of Railroad property by pipeline occupations must agree, upon approval of the engineering and construction details by the Chief Engineer, to execute an appropriate Railroad occupational agreement and pay any required fees and/or rentals specified therein.

b. The application for an occupancy shall be by letter giving the following:

- (1) Full name of Owner.
- (2) Complete mailing address of the applicant.
- (3) Name and title of person who will sign the agreement.
- (4) The State in which the applicant is incorporated.

c. All applications shall be accompanied with three (3) copies of all design and construction plans and three (3) copies of all specifications and engineering computations for the proposed occupancy. On extensive projects, only those plans involving work on or affecting Railroad property and operations shall be submitted. Included shall be a plan showing the extent of the total project upon which that portion of the work affecting the Railroad is clearly defined.

d. All of the above plans, specifications and computations must be prepared by and bear the seal of a Professional Engineer.

#### **1.4 Right of Entry**

a. No entry upon Railroad property for the purpose of conducting surveys, field inspections, obtaining soils information or any other purposes associated with the design and construction for the proposed occupancy, will be permitted without a proper entry permit prepared by the Chief Engineer, or his designated representative. The applicant must pay the associated fees and execute the entry permit.

b. It is to be clearly understood that the issuance of an entry permit does not constitute authority to proceed with any construction. Construction can not begin until a formal agreement is executed by the Railroad and the Owner receives permission, from the designated inspection agency of Railroad, to proceed with the work.

#### **1.5 Site Inspection**

a. For longitudinal occupancy of the Railroad property a site inspection along the proposed pipeline route may be required before final design plans are prepared. When a site inspection is required, the applicant and/or his engineer must meet with representatives of the Chief Engineer's Office to view to entire length of the proposed occupancy.

b. Prior to the site inspection the applicant must submit the following information:

- (1) A plan view of the proposed route showing all tracks, both Railroad right-of-way lines and all other facilities located on the right-of-way. The distance from the proposed pipeline to the adjacent track and to the right-of-way lines must be shown.

- (2) A complete "Pipe Data Sheet". (See Plate I).
- (3) Typical cross sections along the proposed route. (See Plate V).

c. Site inspections for pipe crossings are not required unless, in the opinion of the Chief Engineer, the size and location of the facility warrant an inspection.

## **1.6 Information Required for Submission**

### **1.6.1 Plans and Computations**

a. Plans for proposed pipeline occupancies shall be submitted to and approved by the Chief Engineer prior to Railroad's issuance of an agreement and start of construction.

b. Plans are to be prepared in sizes as small as practical and shall be folded, individually, by the applicant to an 8 1/2 inch and 11 inch size, as shown on Plate X, prior to submission. Where more than one plan is involved, the folded plans shall be assembled into complete sets by the applicant before submission. Failure of the applicant to comply with these requirements may be sufficient cause for rejection of the application.

c. Plans shall be drawn to scale and shall include the following (See Plates I to VII):

- (1) Plan view of proposed pipeline in relation to all Railroad facilities and facilities immediately adjacent to Railroad including, but not limited to, tracks, buildings, signals, pole lines, other utilities and all other facilities that may affect or influence the pipeline design and construction. (See Plate II).
- (2) The location (in feet) of the pipe from the nearest Railroad Milepost and/or from the centerline of a Railroad bridge, giving the Railroad bridge number.
- (3) In all cases, the name of the State and County in which the proposed facilities are located must be shown. In States where Townships, Ranges and Sections are used, show the distance in feet to the nearest Section line and identify the Section number, Township and Range.
- (4) The profile of the ground above the centerline of the pipe, from field survey, showing relationship of the pipeline and/or casing pipe to the ground levels, the tracks and other facilities. (See Plate III).

For longitudinal occupations, the profile of the adjacent track, or tracks, shall be shown. (See Plate IV).

- (5) All Railroad property lines indicated by dimensions, in feet, to the centerline of adjacent track as well as the overall width of the Railroad right-of-way.

If the pipeline is in a public highway, the limits of the dedicated highway right-of-way, as well the limits of any paving, sidewalks etc., shall be defined, by dimensions in feet, from the centerline of the dedicated right-of-way.

- (6) The angle of the crossing in relation to the centerline of the track(s).
- (7) On pipelines having valves, the distance in feet along the pipeline from the crossing to the nearest valves and/or control stations.
- (8) A separate "Pipe Data Sheet" (See Plate I) shall be submitted on 8 1/2 inch by 11 inch sheet size for each crossing.

d. The plan shall be specific, on Railroad property and under tracks that are not on Railroad property, as to:

- (1) The method of installation. (See Section 5.1).
- (2) The size and material of the casing pipe.
- (3) The size and material of the carrier pipe.

These items can not have an alternative and any application that is received that indicates options in any of the above items will not be processed.

e. Once the application has been approved by the Chief Engineer, no variance from the plans, specifications, method of installation, construction, etc., as approved in the occupancy document, will be considered or permitted without the payment to Railroad of additional fees for the re-processing of the application.

f. All plans and computations associated with the work under the agreement shall be prepared by, and bear the seal of, a Professional Engineer. If not so imprinted, the application will be given no further consideration. This requirement also applies to all data submitted by the Owner's contractor. Contractor's plans and computations which are not stamped will be returned and construction will not be permitted to proceed.

### **1.6.2 Specifications**

a. Project specifications, for all work on and affecting the Railroad right-of-way, shall be included with the submission. All pertinent requirements of this document shall be included.

## 1.7 Notification to Proceed with Construction

a. After approval of the engineering plans and specifications and execution of the occupational agreement, the Owner will be notified of the appropriate Railroad Area Engineer's Office which must be contacted prior to start of construction. The Area Engineer's Office will provide the Railroad's inspection of the project and coordinate all other construction aspects of the project which relate to Railroad (flagging, track work, etc.).

b. The Area Engineer's Office must be notified a minimum of fourteen (14) working days prior to desired start of construction.

## 2.0 GENERAL REQUIREMENTS

### 2.1 Use of Casing Pipe

a. A casing pipe will be required for all pipeline crossings carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure, and all non-flammable substances which, from their nature or pressure, as determined by the Chief Engineer, might cause damage if escaping on or near Railroad property.

b. Pressure pipelines which do not cross under the track but are located within 25 feet of the centerline of any track or closer than 45 feet to nearest point of any bridge, building or other important structure shall be encased.

c. The casing pipe shall be laid across the entire width of the Railroad's right-of-way, plus three (3) feet on both sides of the Railroad's right of way, except where a greater length is required to comply with Section 4.2.1 f. of this specification, even though such extension is beyond the right-of-way.

### 2.2 Location of Pipeline on the Right-of-Way

a. Pipelines laid longitudinally on Railroad's right-of-way shall be located as far as practicable from any tracks or other important structures and as close to the Railroad property line as possible. Longitudinal pipelines must not be located in earth embankments or within ditches located on the right-or-way.

b. Pipelines shall be located, where practicable, to cross tracks at approximate right angles to the track, but preferably at not less than 45 degrees.

c. Pipelines shall not be placed within a culvert, under Railroad bridges, nor closer than 45 feet to any portion of any Railroad bridge, building, or other important structure, except in special cases, and then by special design, as approved by the Chief Engineer.

d. Pipelines shall not be located within the limits of a turnout when crossing the track.

e. Where possible, pipelines shall not be located within the limits of a grade crossing when open cut is the method of installation.

f. Pipelines carrying liquefied petroleum gas shall, where practicable, cross the Railroad where tracks are carried on embankment.

### **2.3 Depth of Installation**

a. Pipelines placed under Railroad track(s) and across the Railroad's right-of-way shall be not less than 5-1/2 feet from base of rail to top of pipe at its closest point, except that under sidings or industry tracks this distance may be 4-1/2 feet as approved by the Chief Engineer. On other portions of the right-of-way, where the pipe is not directly beneath any track, the depth from ground surface or from bottom of ditch to top of pipe shall not be less than three (3) feet. Where three (3) feet of cover can not be provided from bottom of ditch, a six (6) inch thick concrete slab shall be provided over the pipeline for protection.

b. Pipelines laid longitudinally on Railroad's right-of-way, 50 feet or less from centerline track, shall be buried not less than five (5) feet from ground surface to top of pipe for pipelines carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure and all non-flammable substances which by their nature or pressure, in the judgment of the Chief Engineer, may be hazardous to life or property. For pipelines carrying water, sewage and non-flammable substances, the distance from surface of ground to top of pipe may be four (4) feet.

c. Where the pipeline is laid more than 50 feet from centerline of track, the minimum cover shall be at least three (3) feet.

### **2.4 Pipelines within Limits of a Dedicated Highway**

a. Pipelines within the limits of a dedicated highway are subject to all the requirements of this specification and must be designed and installed in accordance with them.

b. The limits of the dedicated highway (right-of-way) must be clearly shown on the plans.

c. Construction can not begin until an agreement has been executed between Railroad and the Owner and proper notification has been given to the Railroad's Area Engineer. (See Section 1.7).

## **2.5 Modification of Existing Facilities**

a. Any replacement or modification of an existing carrier pipe and/or casing shall be considered as a new installation, subject to the requirements of this specification.

## **2.6 Abandoned Facilities**

a. The owner of all abandoned pipe crossings and other occupancies shall notify the Chief Engineer, in writing, of the intention to abandon.

b. Abandoned pipelines shall be removed or completely filled with cement grout, compacted sand or other methods as approved by the Chief Engineer.

c. Abandoned manholes and other structures shall be removed for a minimum distance of two (2) feet below existing grade and completely filled with cement grout or compacted sand.

## **2.7 Conflict of Specifications**

a. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree so prescribed shall be deemed a part of this specification.

## **2.8 Insulation**

a. Pipelines and casings shall be suitably insulated from underground conduits carrying electric wires on Railroad property.

## **2.9 Corrosion Protection and Petroleum Leak Prevention**

a. Pipelines on the Railroad property that carry petroleum products or hazardous liquids shall be designed in accordance with current federal, state and/or local regulations that mandate leak detection automatic shutoff, leak monitoring, and sacrificial anodes and/or exterior coatings to minimize corrosion and prevent petroleum releases.

## **3.0 SOIL INVESTIGATION**

### **3.1 General**

a. For all pipe crossings sixty (60) inches in diameter and larger under tracks, and at other locations the Chief Engineer may direct, test borings or other soil investigations, approved by Railroad, shall be made to determine the nature of the underlying material. (See Section 1.4 relative to procedures).

b. For pipe crossings less than sixty (60) inches in diameter under tracks, and at other location as the Chief Engineer may direct, test boring or other approved investigations may be required when, in

the judgment of the Chief Engineer, they are necessary to determine the adequacy of the design and construction of the facilities.

### 3.2 Location

a. Borings shall be made on each side of the tracks, on the centerline of the pipe crossing, and as close to the tracks as practicable. (See Section 1.4 relative to procedures).

b. Test boring logs shall be accompanied with a plan, drawn to scale, showing the location of the borings in relation to the track(s) and the proposed pipe.

### 3.3 Sampling

a. Test borings shall be made in accordance with current ASTM Designation D 1586 except that sampling must be continuous from the ground surface to five (5) feet below the proposed invert unless rock is encountered before this depth. Where rock is encountered it is to be cored using a Series "M" Double Tube Core Barrel, with a diamond bit, capable of retrieving a rock core at least 1 5/8" in diameter. Individual core runs are not to exceed five (5) feet in length.

### 3.4 Boring Logs

a. Test boring logs shall comply with Plate VIII and clearly indicate all of the following:

- (1) Boring number as shown on the required boring location plan.
- (2) Ground elevation at each boring using same datum as the pipeline construction plans.
- (3) Engineering description of soils or rock encountered.
- (4) Depth and percent recovery of all soil samples.
- (5) Depth from surface for each change in strata.
- (6) Blows for each six (6) inches of penetration for the standard penetration test described in ASTM D 1586.
- (7) Percent recovery and Rock Quality Designation (RQD) for all rock cores.
- (8) Depth to ground water while sampling and when it has stabilized in the bore hole.

b. The location of the carrier pipe and/or casing pipe shall be superimposed on the boring logs before submission to the Chief Engineer.

c. All borings shall be sealed, for their full depth, with a 4-3-



1 bentonite-cement-sand grout after accurate ground water readings have been taken and recorded.

d. Soil samples taken from auger vanes or return washwater are not acceptable.

### 3.5 Additional Information

a. When directed by the Chief Engineer, additional borings may be required for the purpose of taking undisturbed thin-wall piston samples or Dennison type samples for laboratory testing to determine the index and engineering properties of certain soil strata.

## 4.0 DESIGN REQUIREMENTS

### 4.1 Design Loads

a. The dead load of the earth shall be considered as 120 pounds per cubic foot unless soil conditions warrant the use of a higher value.

#### 4.1.2 Railroad Loads

a. The Railroad live load used shall be a Cooper E-80 loading with 50% added for impact. The values shown in Table 1 shall be used for the vertical pressure on a buried structure for the various heights of cover.

**Table 1**

Live loads, including impact for various heights of cover for a Cooper E-80 loading.

<u>Height of Cover (FT)</u>	<u>Load (LB/SQ FT)</u>
2	3800
5	2400
8	1600
10	1100
12	800
15	600
20	300
30	100

b. To determined the horizontal pressure caused by the Railroad loading on a sheet pile wall or other structure adjacent to the track the Boussinesq analysis shall be used. The load on the track shall be taken as a strip load with a width equal to the length of the ties, (8'-6"). The vertical surcharge,  $q$  (psf), caused by each axle, shall be uniform and equal to the axle weight divided by the tie length and the axle spacing, (5'-0"). for the E-80 loading this results in:

$$q = 80,000 / (8.5 \times 5) = 1882 \text{ psf.}$$

The horizontal pressure due to live load surcharge at any point on the wall is  $p$  and can be calculated by the following:

$$p = (2q/\pi)(\beta - \sin \beta (\cos 2 \theta)) \quad (\text{See PLATE IX})$$

c. The vertical and horizontal pressures given above shall be used unless an alternate design method is approved by the Chief Engineer. Proposals to use an alternate design method must include acceptable references and a statement explaining the justification for choosing the alternate method.

## 4.2 Casing Pipe

### 4.2.1 General Requirements

a. Casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length, except at ends of casing where ends are left open, or through vent pipes when ends of casing are sealed. Casing shall be installed so as to prevent the formation of a waterway under the Railroad, and with an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

b. The casing pipe and joints shall be of metal and of leakproof construction when the pipeline is carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure.

c. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed.

For steel pipe casings, the inside diameter of the casing pipe shall be at least two (2) inches greater than the largest outside diameter of the carrier pipe joints or couplings, for carrier pipe less than six (6) inches in diameter; and at least four (4) inches greater for carrier pipe six (6) inches and over in a diameter.

d. For flexible casing pipe, a minimum vertical deflection of the casing pipe of three (3) percent of its diameter, plus 1/2 inches, shall be provided so that no loads from the roadbed, track, traffic or casing pipe itself are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the inside diameter of the flexible casing pipe shall be at least two (2) inches greater than the outside diameter of the carrier pipe for pipe less than eight (8) inches in diameter; at least 3-1/4 inches greater for pipe eight (8) inches to 16 inches, inclusive, in diameter; and at least 4-1/2 inches greater for pipe 18 inches and over in diameter.

e. In no event shall the casing pipe diameter be larger than is necessary to permit the insertion of the carrier pipe.

f. Casing pipe under Railroad tracks and across Railroad's right-

of-way shall extend the **Greater** of the following distances, measured at right angle to centerline of track:

- (1) Across the entire width of the Railroad right-of-way and extending not less than 2 1/2 feet beyond said right-of-way.
- (2) Three (3) feet beyond ditch line.
- (3) Two (2) feet beyond toe of slope.
- (4) A minimum distance of 25 feet from each side of centerline of outside track when casing is sealed at both ends, but not less than 2 1/2 feet beyond said right-of-way.
- (5) A minimum distance of 45 feet from centerline of outside track when casing is open at both ends.
- (6) Beyond the theoretical Railroad embankment line. This line begins at a point, on existing grade, 10'-0" horizontally from centerline track and extends downward on a 1-1/2 (H) to 1(V) slope. (See Plate III).

g. If additional tracks are constructed in the future, the casing shall be extended correspondingly at the Owner's expense.

#### **4.2.2 Steel Pipe**

- a. Steel pipe may be installed by open cut, boring or jacking.
- b. Steel pipe shall have a minimum yield strength of 35,000 psi. The ASTM or API specification and grade for the pipe is to be shown on the Pipe Data Sheet (Plate I).
- c. Joints between the sections of pipe shall be fully welded around the complete circumference of the pipe.
- d. Steel pipes with a minimum cover of 5'-6" shall have a minimum wall thickness as shown in Table 2, unless computations indicate that a thicker wall is required.

**Table 2**

Nominal Diameter (Inches)	Coated or Cathodically Protected	Uncoated and Unprotected
	Nominal Thickness (Inches)	
10 and under	0.188	0.188
12 and 14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 and 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 and 36	0.469	0.532
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 and 46	0.594	0.657
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.781
56 and 58	0.750	0.812
60	0.781	0.844
62	0.812	0.875
64	0.844	0.906
66 and 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

e. Coated steel pipe that is bored or jacked into place shall conform to the wall thickness requirements for uncoated steel pipe since the coating may be damaged during installation.

f. Smooth wall steel pipes with a nominal diameter over 72 inches will not be permitted.

#### **4.2.3 Ductile Iron Pipe**

a. Ductile iron pipe shall be installed by open cut only.

b. Ductile iron pipe shall conform to the requirements of ANSI A21.51/AWWA C-151, Class 56.

c. The pipe shall have mechanical or push on type joints.

#### **4.2.4 Corrugated Steel and Corrugated Structural Steel Plate Pipe**

a. Corrugated steel pipe and corrugated structural steel plate pipe may be used for a casing only when placed by the open cut method. Jacking or boring through the Railroad embankment is not permitted.

b. Pipe shall be bituminous coated and shall conform to the current American Railway Engineering Association Specifications Chapter 1, Part 4.

c. Corrugated steel pipe shall have a minimum sheet thickness as shown in Table 3. Corrugated structural steel plate pipe shall have a minimum plate thickness of 0.168 inches (8 gage). If computations indicate that a greater thickness is required, the thicker sheet or plate shall be used.

**Table 3**

Pipe Diameter (inches)	Sheet Thickness (inches) (gage)	
12 to 30	0.079	14
36	0.109	12
42 to 54	0.138	10
60 to 120	0.168	8

#### **4.2.5 Steel Tunnel Liner Plates**

a. Liner plates shall be installed by the tunneling method as detailed in Section 5.1.5 in this specification.

b. Tunnel liner plates shall be galvanized and bituminous coated and shall conform to current AREA Specification Chapter 1, Part 4.17. If the tunnel liner plates are used only to maintain a tunneled opening until the carrier pipe is installed, and the annular space between the carrier pipe and the tunnel liner is completely filled with cement grout within a reasonably short time after completion of the tunnel, then the tunnel liner plates need not be galvanized or coated.

c. Tunnel liner plates are to be a minimum of 12 gage and shall be fabricated from structural quality, hot-rolled, carbon-steel sheets or plates conforming to ASTM Specification A 569.

d. The following liner plate information must be shown on the Pipe Data Sheet (Plate I):

- (1) Number of flanges (2 or 4).
- (2) Width of plate.
- (3) Whether plate is smooth or corrugated.

#### 4.2.6 Reinforced Concrete Pipe

a. Reinforced concrete pipe shall be installed by the open cut or jacking method.

b. Reinforced concrete pipe may be used for a casing provided the pressure in the carrier pipe is less than 100 psi.

c. Pipe placed by open cut shall be installed in accordance with AREA Chapter 8, Part 10, Section 10.4 except that backfill and compaction shall be in accordance with Section 5.1.2 of this specification.

d. Pipe jacked into place shall have tongue and groove joints and shall be installed in accordance with Section 5.1.4 of this specification.

e. Reinforced concrete pipe shall conform to the current ASTM Specification C-76, Class V, Wall C.

#### 4.2.7 Concrete Encasement

a. At locations where the installation is by open cut and a casing pipe is required, but can not be installed due to elbows or other obstructions, concrete encasement may be used when approved by the Chief Engineer.

b. The concrete encasement must be a minimum of six (6) inches thick around the pipe. A 6 x 6 - W 2.9 x W 2.9 welded wire fabric shall be placed in the concrete on all sides.

#### 4.3 Carrier Pipe

a. Carrier pipes within a casing shall be designed for Railroad live loads as if they were not encased.

b. The pipe shall be laid with sufficient slack so that it is not in tension.

c. Steel pipe shall not be used to convey sewage, storm water or other liquids which could cause corrosion.

d. The following shall be the minimum requirements for all carrier pipes located on Railroad's right-of-way or under tracks which the Railroad operates:

(1) Ductile Iron Pipe - ANSI A21.51/AWWA C-151, Class 56.

(2) Reinforced Concrete Pipe - ASTM C-76, Class V, Wall C.

(3) Vitrified Clay Pipe - ASTM C-700, Extra Strength.

- (4) Corrugated Metal pipe - AREA Chapter 1, Part 4.
  - (a) Minimum Gage of pipe to be in accordance with Section 4.2.4 (Table 3) of this specification.
- (5) Steel Pipe -
  - (a) Steel pipe must have a minimum yield strength of 35,000 psi. The ASTM or API specification and grade for the pipe is to be shown on the Pipe Data Sheet.
  - (b) Minimum wall thickness to be in accordance with Section 4.2.2 (Table 2) of this specification.
- (6) Others - As approved by the Chief Engineer.

#### **4.3.1 Pipelines Carrying Flammable Substances**

a. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall be of metal and conform to the requirements of the current ANSI B 31.4, with Addenda, Liquefied Petroleum Transportation Piping Systems, ANSI B 31.8, "Gas Transmission and Distribution Piping Systems" and other applicable ANSI Codes, except that the maximum allowable stresses for design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by the longitudinal joint factor) of the pipe as defined in the ANSI Codes:

- (1) The following percentages apply to hoop stress in steel pipe within a casing under Railroad tracks, across Railroad right-of-way and longitudinally on Railroad right-of-way:
  - (a) Seventy-two percent on oil pipelines.
  - (b) Fifty percent for pipelines carrying condensate, natural gasoline, natural gas liquids, liquefied petroleum gas, and other petroleum products.
  - (c) Forty percent for gas pipelines.

#### **4.4 End Seals**

a. Casings for carriers of flammable and hazardous substances shall be suitably sealed to the outside of the carrier pipe. Details of the seals shall be shown on the plans.

b. Casings for carriers of non-flammable substances shall have both ends of the casing blocked up in such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event of a carrier break.

c. Where ends of casings are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be conducted away from Railroad tracks and structures.

#### 4.5 Vents

a. Sealed casings for flammable substances shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter, and shall be attached near each end of the casing and project through the ground surface at right-of-way lines or not less than 45 feet (measured at right angles) from centerline of nearest track.

b. Vent pipes shall extend not less than four (4) feet above the ground surface. Top of vent pipe shall have a down-turned elbow, properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner approved by the Chief Engineer.

c. Vent pipes shall be at least four (4) feet (vertically) from aerial electric wires or greater if required by National Electrical Safety Code (ANSI C2).

d. When the pipeline is in a public highway, street-type vents shall be installed.

#### 4.6 Signs

a. All pipelines (except those in streets where it would not be practical to do so) shall be prominently marked at right-of-way lines (on both sides of track for crossings) by durable, weatherproof signs located over the centerline of the pipe. Signs shall show the following:

- (1) Name and address of owner.
- (2) Contents of pipe.
- (3) Pressure in pipe.
- (4) Pipe depth below grade at point of a sign.
- (5) Emergency telephone number in event of pipe rupture.

b. For pipelines running longitudinally on Railroad property, signs shall be placed over the pipe (or offset and appropriately marked) at all changes in direction of the pipeline. Such signs should also be located so that when standing at one sign the next adjacent marker in either direction is visible. In no event shall they be placed more than 500 feet apart unless otherwise specified by the Chief Engineer.



c. The Owner must maintain all signs on the Railroad's right-of-way as long as the occupational agreement is in effect.

#### **4.7 Shut-off Valves**

a. Accessible emergency shut-off valves shall be installed within effective distances each side of the Railroad at locations selected by the Chief Engineer where hazard to life and property must be guarded against. No additional valves will be required where pipelines are provided with automatic control stations and within distances approved by the Chief Engineer.

#### **4.8 Cathodic Protection**

a. Cathodic protection shall be applied to all pipelines carrying flammable substances on Railroad's right-of-way.

b. For crossings and at other locations where the pipeline must be placed within a casing, the casing is to have cathodic protection or the wall thickness is to be increased to the requirements of Section 4.2.2 Table 2.

c. Where casing and/or carrier pipe is cathodically protected by other than anodes, the Chief Engineer shall be notified and a suitable test made to ensure that other Railroad structures and facilities are adequately protected from the cathodic current in accordance with the recommendation of current Reports of Correlating Committee on Cathodic Protection, published by the National Association of Corrosion Engineers.

d. Where sacrificial anodes are used the locations shall be marked with durable signs.

#### **4.9 Manholes**

a. Manholes shall not be located on Railroad property where possible. At locations where this is not practical, including longitudinal occupancies, manholes shall be precast concrete sections conforming to ASTM Designation C 478, "Specification for Precast Concrete Manhole Sections".

b. The top of manholes located on Railroad property shall be flush with top of ground.

c. The distance from centerline of adjacent track to centerline of proposed manhole shall be shown on the plans.

#### **4.10 Box Culverts**

a. Reinforced concrete box culverts shall conform to the requirements of AREA Chapter 8, Part 16.

#### 4.11 Drainage

a. Occupancies shall be designed, and their construction shall be accomplished, so that adequate and uninterrupted drainage of Railroad's right-of-way is maintained.

b. All pipes, ditches and other structures carrying surface drainage on Railroad property and/or under Railroad tracks shall be designed to carry the run-off from a one hundred (100) year storm. Computations indicating this design and suitable topographic plans, prepared by a Professional Engineer, shall be submitted for the Railroad's approval.

c. If the drainage is to discharge into an existing drainage channel on the Railroad's right-of-way and/or under Railroad tracks, the computations should include the hydraulic analysis of any existing structure.

d. Detention ponds must not be placed on any part of the Railroad's right-of-way. Also, the Railroad embankment must not be used as any part of a detention pond structure.

e. Submitted with the computations shall be formal approval of the proposed design by the appropriate governmental agency having jurisdiction.

#### 4.12 Pipelines on Bridges

a. Pipelines of any type shall not be installed on any bridge carrying Railroad tracks.

b. New overhead pipe bridges shall not be constructed over the Railroad's right-of-way where underground installation of the pipeline is possible. Where the Applicant can show that no practicable alternative is available, this type of structure will be permitted provided the following conditions are met:

- (1) The vertical clearance, distance from top of rail to bottom of structure, is shown and is a minimum of 23'-0".
- (2) The support bents for the overhead structure are located off of Railroad's right-of-way or a minimum distance of 18'-0" from centerline track, whichever distance is greater.
- (3) Support bents within 25'-0" of centerline track have pier protection in accordance with AREA, Chapter 8, Part 2, Section 2.1.5.
- (4) Complete structural plans and design computations for the structure and foundations, stamped by a Professional Engineer, are submitted with the application.

c. Pipelines carrying flammable substances or non-flammable substances, which by their nature might cause damage if escaping on or near Railroad facilities or personnel, shall not be installed on bridges over Railroad tracks. In special cases when it can be demonstrated to the Chief Engineer's satisfaction that such an installation is necessary and that no practicable alternative is available, the Chief Engineer may permit the installation and only by special design approved by him.

d. When permitted, pipelines on bridges over Railroad tracks shall be so located as to minimize the possibility of damage from vehicles, Railroad equipment, vandalism and other external causes. They shall be encased in a casing pipe as directed by the Chief Engineer (See Plate VII).

## **5.0 CONSTRUCTION REQUIREMENTS**

### **5.1 Method of Installation**

#### **5.1.1 General Requirements**

a. Bored, jacked or tunneled installations shall have a bore hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating.

b. The use of water or other liquids to facilitate casing emplacement and spoil removal is prohibited.

c. If during installation an obstruction is encountered which prevents installation of the pipe in accordance with this specification, the pipe shall be abandoned in place and immediately filled with grout. A new installation procedure and revised plans must be submitted to, and approved by, the Chief Engineer before work can resume.

#### **5.1.2 Open Cut**

a. The Owner must request open cut approval when making application for occupancy.

b. Installations beneath the track by open trench methods will be permitted only with the approval of the Division General Manager of the territory involved.

c. Installations by open cut will not be permitted under mainline track(s), track(s) carrying heavy tonnage or track(s) carrying passenger trains. Also, open cut shall not be used within the limits of a highway/Railroad grade crossing or its approaches (25 feet either side of traveled way) where possible.

d. At locations where open cut is permitted the trench is to be backfilled with crushed stone with a top size of the aggregate to be a maximum of two (2) inches and to have no more than 5% passing the number 200 sieve. The gradation of the material is to be such that a dense

stable mass is produced.

e. The backfill material shall be placed in loose six (6) inch lifts and compacted to at least 95% of its maximum density with a moisture content that is no more than 1% greater than or 2% less than the optimum moisture as determined in accordance with current ASTM Designation D - 1557 (Modified Proctor). When the backfill material is within three (3) feet of the subgrade elevation (the interface of the ballast and the subsoil) a compaction of at least 98% will be required. Compaction test results confirming compliance must be provided to Railroad's Area Engineer by the Owner.

f. All backfilled pipes laid either perpendicular or parallel to the tracks must be designed so that the backfill material will be positively drained. This may require the placement of lateral drains on pipes laid longitudinally to the track and the installation of stub perforated pipes at the edge of the slopes.

g. Unless otherwise agreed upon, all work involving rail, ties and other track material will be performed by Railroad employees at the sole expense of the Owner.

### **5.1.3 Boring**

a. This method consists of pushing the pipe into the earth with a boring auger rotating within the pipe to remove the spoil.

b. The boring operation shall be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.

c. The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that there will be no unsupported excavation ahead of the pipe.

d. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, procedures as outlined in Section 5.1.1 c. must be implemented immediately.

e. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than one-half inch. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than approximately one (1) inch, grouting (see Section 5.2) or other methods approved by the Chief Engineer shall be employed to fill such voids.

f. The face of the cutting head shall be arranged to provide a reasonable obstruction to the free flow of soft or poor material.

g. Plans and description of the arrangement to be used shall be submitted to the Chief Engineer for approval and no work shall proceed until such approval is obtained.

h. Any method which employs simultaneous boring and jacking for pipes over eight (8) inches in diameter which does not have the above approved arrangement will not be permitted. For pipe eight (8) inches and less in diameter, auguring or boring without this arrangement may be considered for use only as approved by the Chief Engineer.

#### 5.1.4 Jacking

a. This method consists of pushing sections of pipe into position with jacks placed against a backstop and excavation performed by hand from within the jacking shield at the head of the pipe. Ordinarily 36 inch pipe is the least size which should be used, since it is not practical to work within smaller diameter pipes.

b. Jacking shall be in accordance with the current American Railway Engineering Association Specifications, Chapter 1, Part 4, "Jacking Culvert pipe Through Fills". This operation shall be conducted without hand-mining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.

c. Bracing and backstops shall be so designed and jacks of sufficient rating used so that the jacking can be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.

d. When jacking reinforced concrete pipe, a jacking shield shall be fabricated as a special section of reinforced concrete pipe with a steel cutting edge, hood, breasting attachments, etc., cast into the pipe. The wall thickness and reinforcing shall be designed for the jacking stresses.

e. When jacking reinforced concrete pipe, grout holes tapped for no smaller than 1-1/2 inch pipe spaced at approximately three (3) feet around the circumference and four (4) feet longitudinally shall be cast into the pipe at manufacture.

f. Immediately upon completion of jacking operations, the installation shall be pressure grouted as per Section 5.2 of this specification.

#### 5.1.5 Tunneling

a. This method consists of placing rings of liner plates within the tail section of a tunneling shield or tunneling machine. A tunneling shield shall be used for all liner plate installations unless otherwise approved by the Chief Engineer.

b. The shield shall be of steel construction, designed to support

a Railroad track loading as specified in Section 4.1 of this specification, in addition to other loadings it must sustain. The advancing face shall be provided with a hood, extending no less than 20-inches beyond the face and extending around no less than the upper 240 degrees of the total circumference.

It shall be of sufficient length to permit the installation of at least one complete ring of liner plates within the shield before it is advanced for the installation of the next ring of liner plates. The shield shall conform to and not exceed the outside dimensions of the liner plate tunnel being placed by more than one-inch at any point on the periphery unless otherwise approved by the Chief Engineer.

c. The shield shall be adequately braced and provided with necessary appurtenances for completely bulkheading the face with horizontal breastboards, and arranged so that the excavation can be benched as may be necessary. Excavation shall not be advanced beyond the edge of the hood, except in rock.

d. Manufacturer's shop detail plans and manufacturer's computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Chief Engineer for approval.

e. Unless otherwise approved by the Chief Engineer, the tunneling shall be conducted continuously, on a 24-hour basis, until the tunnel liner extends at least beyond the theoretical Railroad embankment line (See Plate III).

f. At any interruption of the tunneling operation, the heading shall be completely bulkheaded.

g. The liner plates shall have tapped grout holds for no smaller than 1-1/2 inch pipe, spaced at approximately three (3) feet around the circumference of the tunnel liner and four (4) feet longitudinally.

h. Grouting behind the liner plates shall be in accordance with Section 5.2 of this specification.

## **5.2 Grouting**

a. For jacked and tunneled installations a uniform mixture of 1:6 (cement:sand) cement grout shall be placed under pressure through the grout holes to fill any voids which exist between the pipe or liner plate and the undisturbed earth.

b. Grouting shall start at the lowest hole in each grout panel and proceed upwards simultaneously on both sides of the pipe.

c. A threaded plug shall be installed in each grout hole as the grouting is completed at that hole.

d. When grouting tunnel liner plates grouting shall be kept as

close to the heading as possible, using grout stops behind the liner plates if necessary. Grouting shall proceed as directed by the Chief Engineer, but in no event shall more than six (6) lineal feet of tunnel be progressed beyond the grouting.

### **5.3 Soil Stabilization**

a. Pressure grouting of the soils or freezing of the soils before jacking, boring, or tunneling may be required at the direction of the Chief Engineer to stabilize the soils, control water, prevent loss of material and prevent settlement or displacement or embankment. Grout shall be cement, chemical or other special injection material selected to accomplish the necessary stabilization.

b. The materials to be used and the method of injection shall be prepared by a Registered Professional Soils Engineer, or by an experienced and qualified company specializing in this work and submitted for approval to the Chief Engineer before the start of work. Proof of experience and competency shall accompany the submission.

### **5.4 Dewatering**

a. When water is known or expected to be encountered, pumps of sufficient capacity to handle the flow shall be maintained at the site and, upon approval of the Chief Engineer to operate them, they shall be in constantly attended operation on a 24-hour basis until, in the sole judgment of the chief Engineer, their operation can be safely halted. When dewatering, close observation shall be maintained to detect any settlement or displacement of Railroad embankment, tracks, and facilities.

### **5.5 Safety Requirements**

a. All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of Railroad facilities. All work on or near Railroad property shall be conducted in accordance with Railroad safety rules and regulations. The contractor shall secure and comply with the Railroad safety rules and shall give written acknowledgment to the Railroad that they have been received, read, and understood by the contractor and his employees. Operations will be subject to Railroad inspection at any and all times.

b. All cranes, lifts, or other equipment that will be operated in the vicinity of the Railroad's electrification and power transmission facilities shall be electrically grounded as directed by the Chief Engineer.

c. At all times when the work is being progressed, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. If boring equipment or similar machines are being used, the machine operator also shall have no less than twelve (12) months experience in

the operation of the equipment being used.

d. Whenever equipment or personnel are working closer than fifteen (15) feet from the centerline of an adjacent track, that track shall be considered as being obstructed. Insofar as possible, all operations shall be conducted no less than this distance.

Operations closer than fifteen (15) feet from the centerline of a track shall be conducted only with the permission of, and as directed by, a duly qualified Railroad employee present at the site of the work.

e. Crossings of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, the Chief Engineer.

## **5.6 Blasting**

a. Blasting will not be permitted under or on Railroad's right-of-way.

## **5.7 Temporary Track Supports**

a. When the jacking, boring or tunneling method of installation is used, and depending upon the size and location of the crossing, temporary track supports shall be installed at the direction of the Chief Engineer.

b. Details of the temporary track supports shall conform to Railroad Standard Plan No. 43380-R1 (Rev. 4-10-90).

c. The Owner's contractor shall supply the track supports with installation and removal performed by Railroad employees.

d. The Owner shall reimburse Railroad for all costs associated with the installation and removal of the track supports.

## **5.8 Protection of Drainage Facilities**

a. If, in the course of construction, it may be necessary to block a ditch, pipe or other drainage facility, temporary pipes, ditches or other drainage facilities shall be installed to maintain adequate drainage, as approved by the Chief Engineer. Upon completion of the work, the temporary facilities shall be removed and the permanent facilities restored.

b. Soil erosion methods shall be used to protect Railroad ditches and other drainage facilities during construction on and adjacent to Railroad's right-of-way.



## **5.9 Support of Excavation Adjacent to Track**

### **5.9.1 Launching and Receiving Pits**

a. The location and dimensions of all pits or excavations shall be shown on the plans with the dimension from centerline of adjacent track to face of pits or excavations clearly labeled. Also, the bottom of pit or excavation must be shown on the profile.

b. The face of all pits shall be located a minimum of twenty-five (25) feet from centerline of adjacent track, measured at right angles to track, unless otherwise approved by the Chief Engineer.

c. If the bottom of the pit excavation intersects the theoretical Railroad embankment line (See Plate III) interlocking steel sheet piling, driven prior to excavation, must be used to protect the track stability. The use of trench boxes or similar devices are not acceptable in this area.

d. Design plans and computations for the pits, stamped by a Professional Engineer, must be submitted by the Owner at time of application or by the contractor prior to start of construction. If the pit design is to be submitted by the contractor, the project specifications must require the contractor to obtain Railroad's approval prior to beginning any work on or which may affect Railroad property.

e. The sheeting shall be designed to support all lateral forces caused by the earth, Railroad and other surcharge loads. See Section 4.1 for Railroad loadings.

f. After construction and backfilling all sheet piling within ten (10) feet of centerline track must be cut off eighteen (18) inches below final grade and left in place.

g. All excavated areas are to be illuminated (flashing warning lights not permitted), fenced and otherwise protected as directed by the Chief Engineer or his designated representative.

### **5.9.2 Parallel Trenching and Other Excavation.**

a. When a pipeline or other structure is to be placed adjacent to a Railroad track within the theoretical Railroad embankment line (See Plate V), interlocking steel sheet piling must be used.

b. The design and construction requirements for this construction shall be in accordance with the requirements of Section 5.9.1.

## **5.10 Inspection and Testing**

a. For pipelines carrying flammable or hazardous materials, ANSI Codes B 31.8 and B 31.4, current at time of constructing the pipeline, shall govern the inspection and testing of the facility on Railroad property, except as follows:

- (1) One-hundred percent of all field welds shall be inspected by radiographic examinations, and such field welds shall be inspected for 100 percent of the circumference.
- (2) The proof testing of the strength of carrier pipe shall be in accordance with the requirements of ANSI B 31.8 for Class Locations 2, 3, or 4, or ANSI B 31.4, as applicable.

#### **5.11 Reimbursement of RAILROAD Costs**

a. All Railroad costs associated with the pipe installation (inspection, flagging, track work, etc.) shall be reimbursed to the Railroad by the Owner of the facility. Reimbursement by the contractor is not acceptable.

**PIPE DATA SHEET**

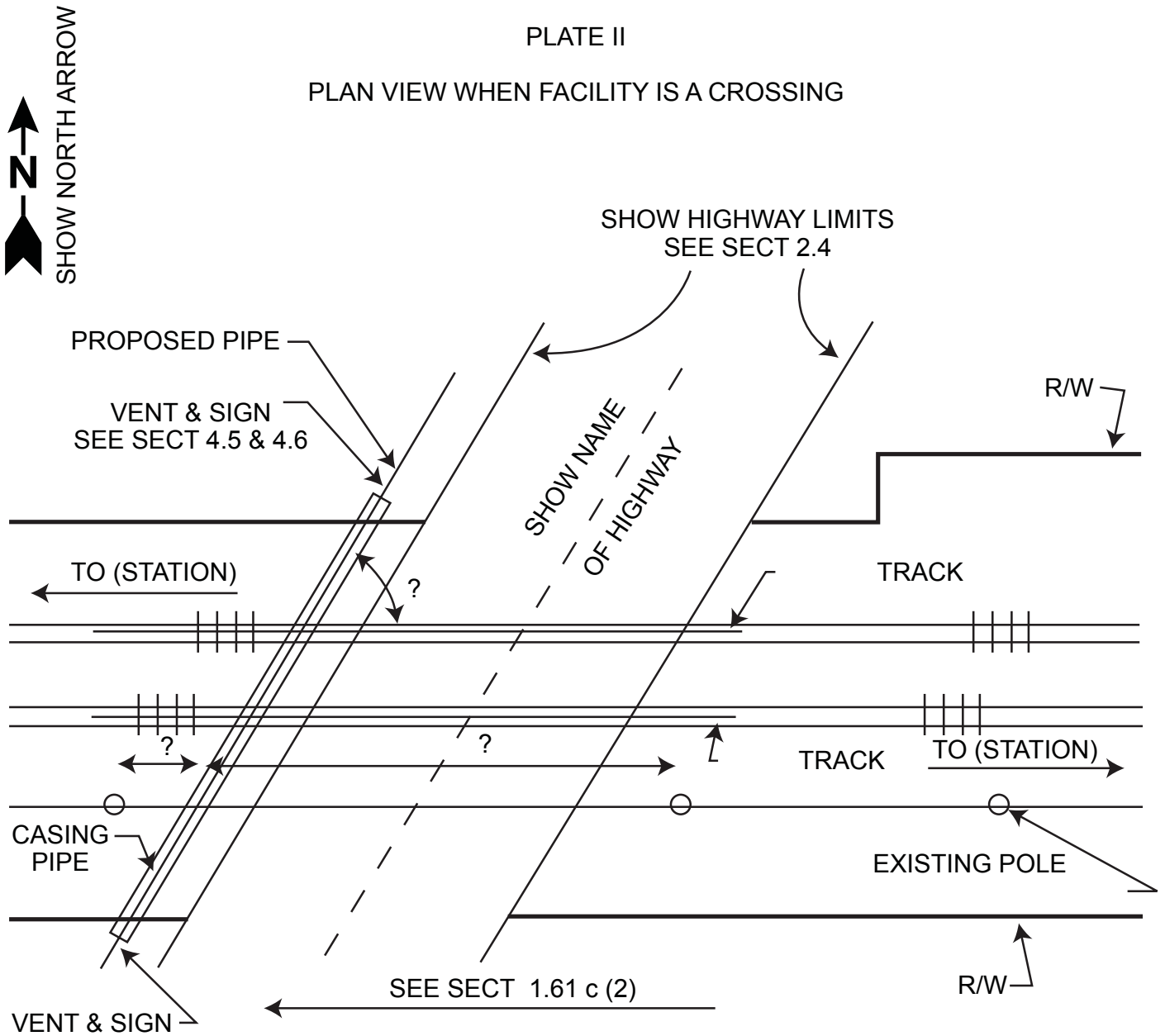
(For crossings and longitudinal occupancy)

	<u>Pipe Data</u>	
	<u>Carrier Pipe</u>	<u>Casing Pipe</u>
Contents To Be Handled.....	_____	_____
Normal Operating Pressure.....	_____	_____
Nominal Size of Pipe.....	_____	_____
O. S. Diameter.....	_____	_____
I. S. Diameter.....	_____	_____
Wall Thickness.....	_____	_____
Weight Per Foot.....	_____	_____
Material.....	_____	_____
Process of Manufacture.....	_____	_____
Specification.....	_____	_____
Grade or Class.....	_____	_____
Test Pressure.....	_____	_____
Type of Joint.....	_____	_____
Type of Coating.....	_____	_____
Details of Cathodic Protection.....	_____	_____
Details of Seal or Protection At Ends of Casing.....	_____	_____
Method of Installation.....	_____	_____
Character of Subsurface Material At The Crossing Location.....	_____	_____
Approximate Ground Water Level.....	_____	_____
Source of Information On Subsurface Conditions (Borings, Test Pits or Other)....	_____	_____

NOTE: Any soil investigation made on Railroad property or adjacent to tracks shall be carried on under the supervision of Railroad's Chief Engineer. (See Section 1.4).

PLATE II

PLAN VIEW WHEN FACILITY IS A CROSSING



PLAN

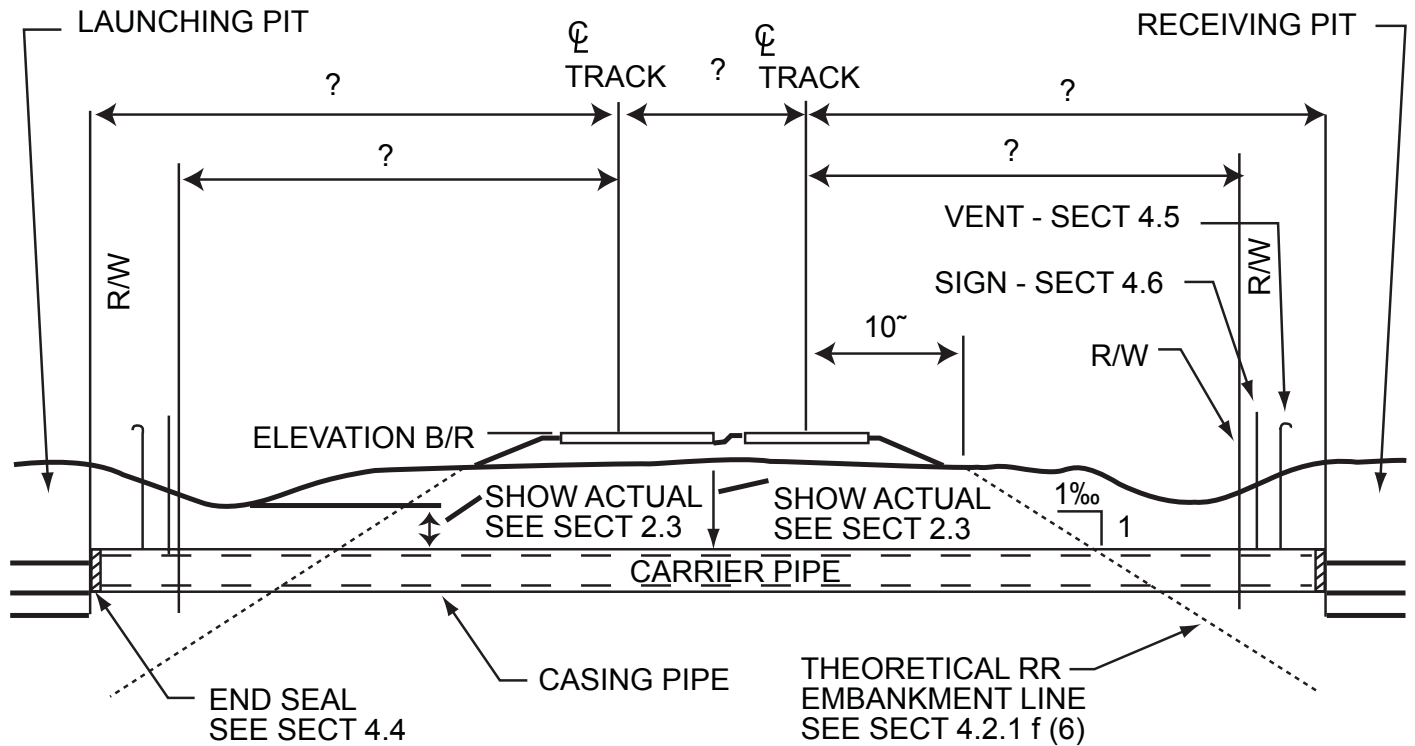
SCALE OF DRAWING TO BE SHOWN

NOTE:

IF THE PROPOSED LINE IS WITHIN THE HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

IF THE PROPOSED PIPE IS TO SERVE A NEW DEVELOPEMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED ARREA AND ROADS IS TO BE SENT WITH THE REQUEST.

PLATE III  
PROFILE OF PIPELINE CROSSING



PROFILE

SCALE OF DRAWING TO BE SHOWN

PLATE IV

PLAN & PROFILE OF LONGITUDINAL OCCUPANCY

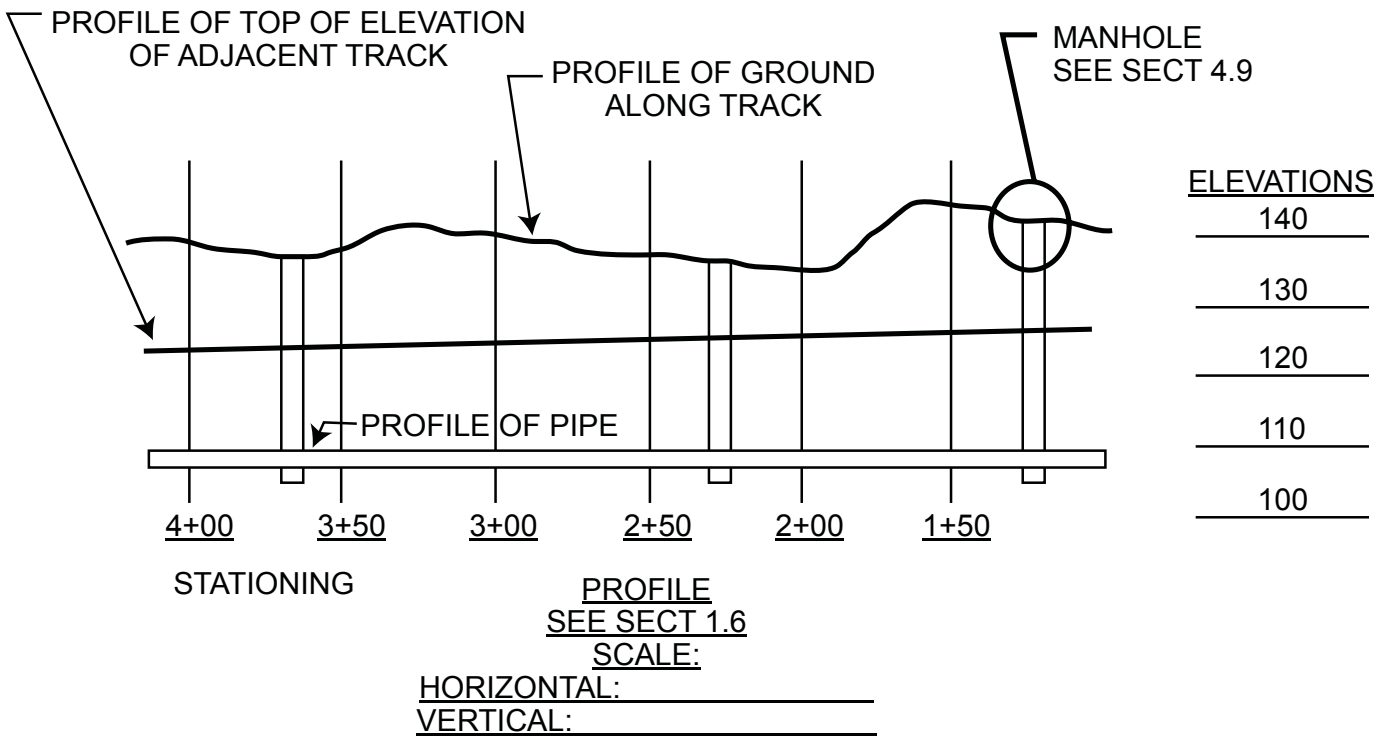
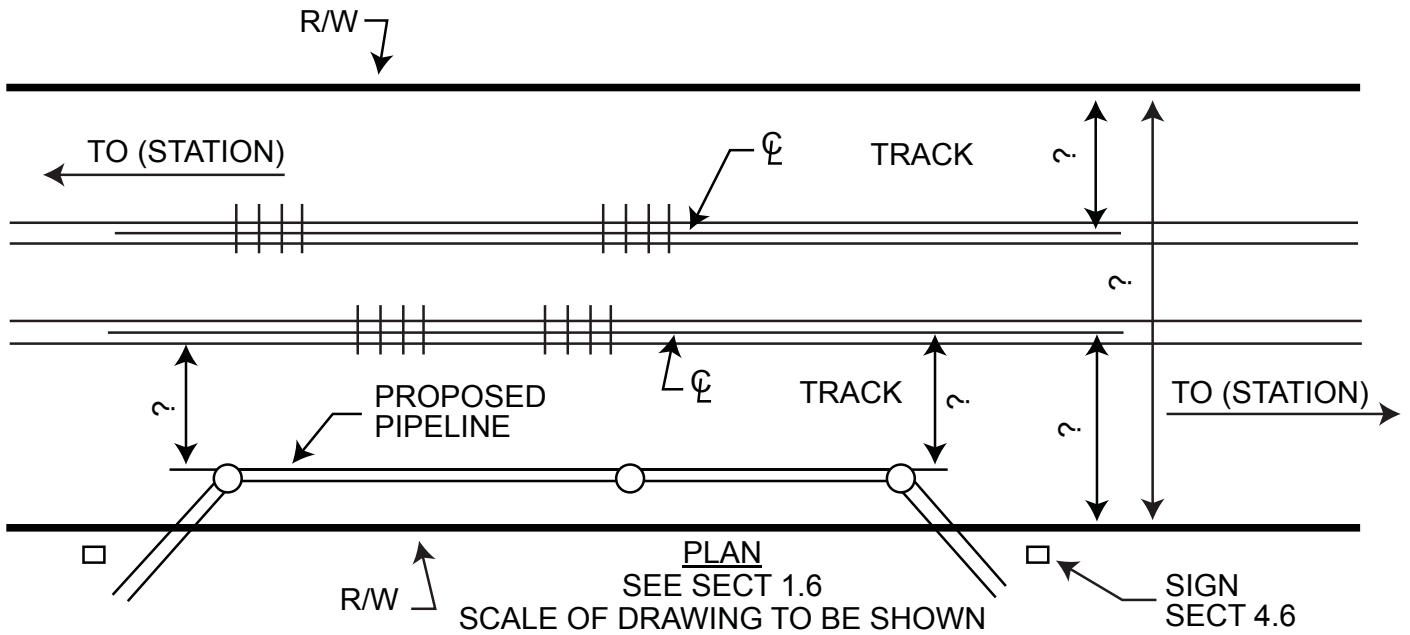
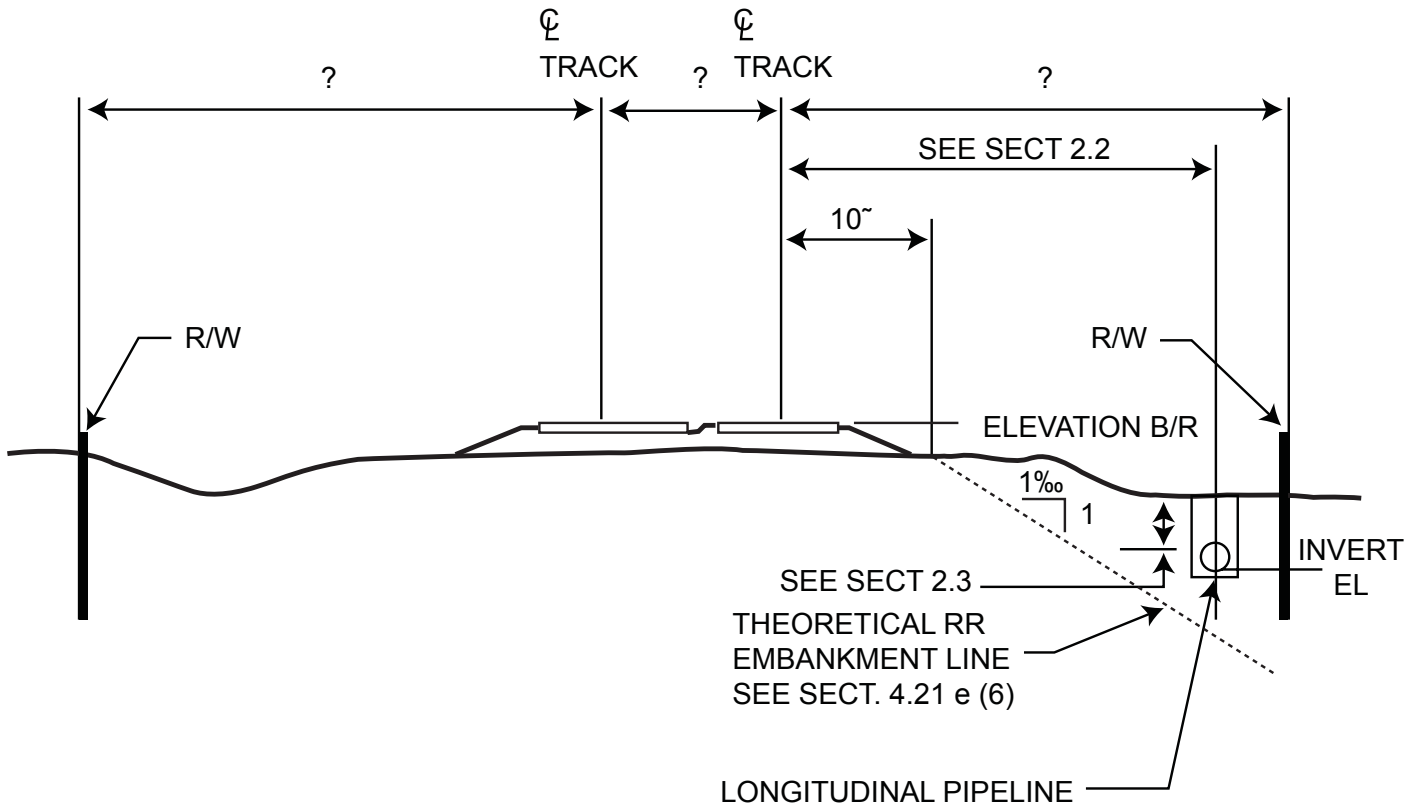


PLATE V  
SECTION OF LONGITUDINAL OCCUPANCY



SECTION

SCALE OF DRAWING TO BE SHOWN

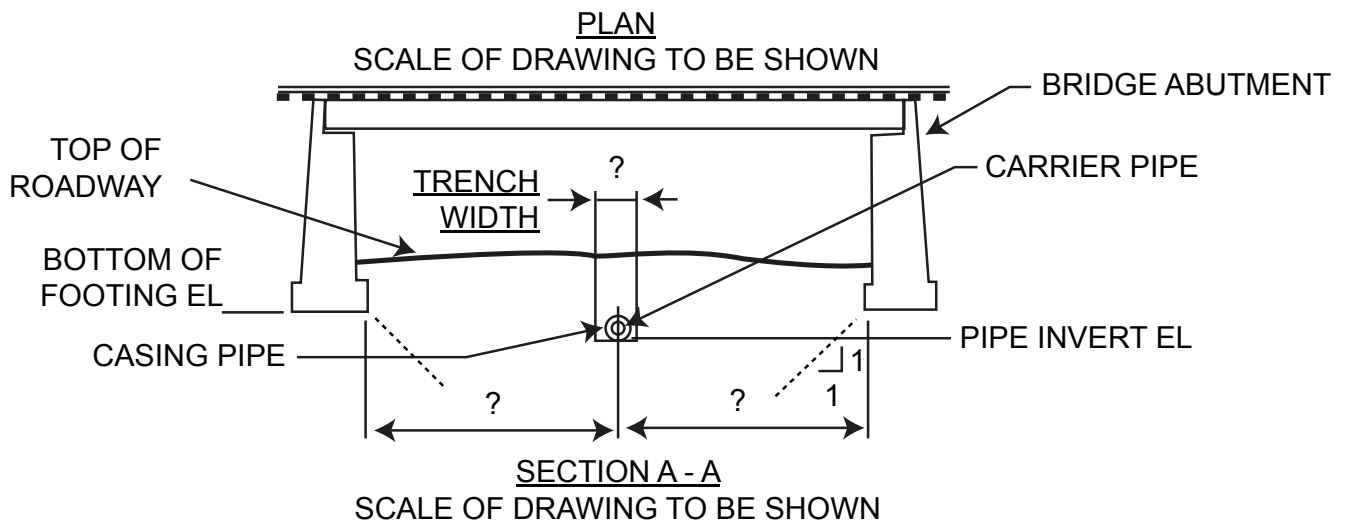
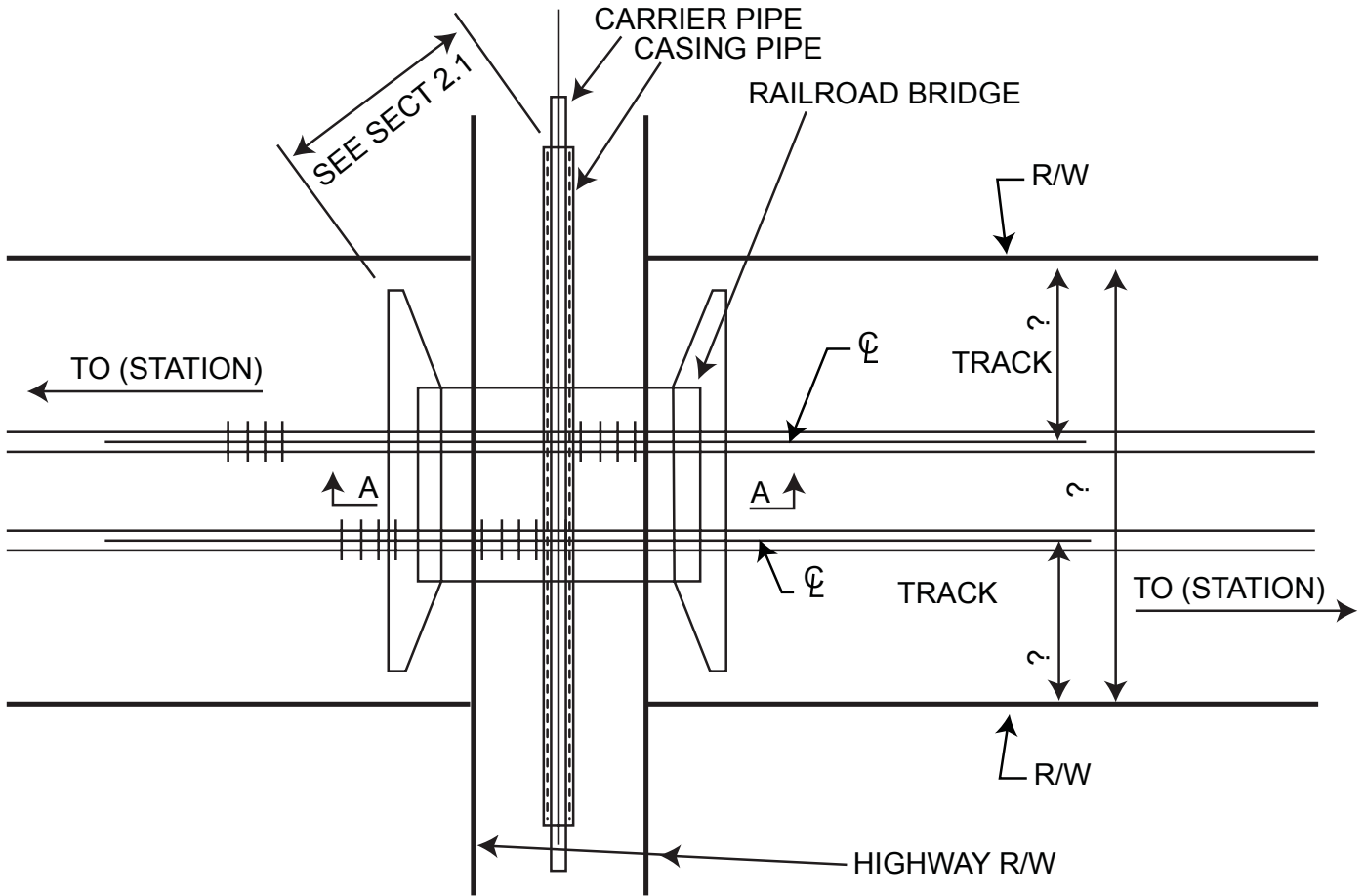
NOTE:

SECTIONS TO BE TAKEN EVERY 500 FEET, MAXIMUM.



PLATE VI

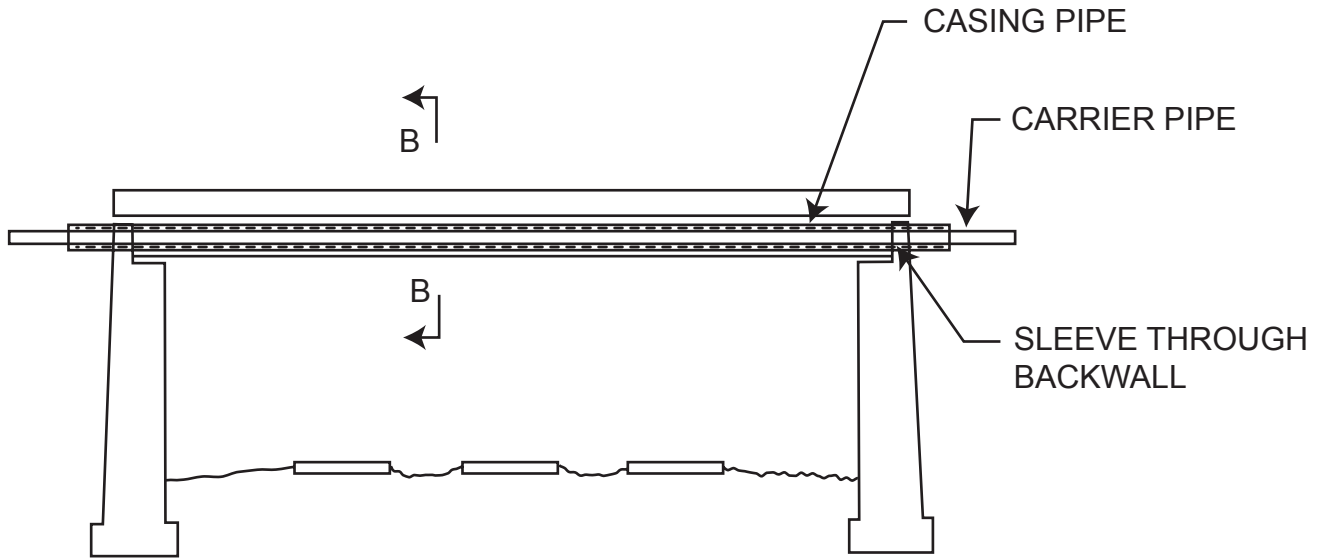
PLAN & SECTION OF PIPELINE IN HIGHWAY UNDER RAILROAD BRIDGE



NOTE:  
 PIPE OR EXCAVATION MUST NOT BE WITHIN THE 1 TO 1 SLOPE LINE THAT EXTENDS FROM THE BOTTOM OF THE FOOTING.

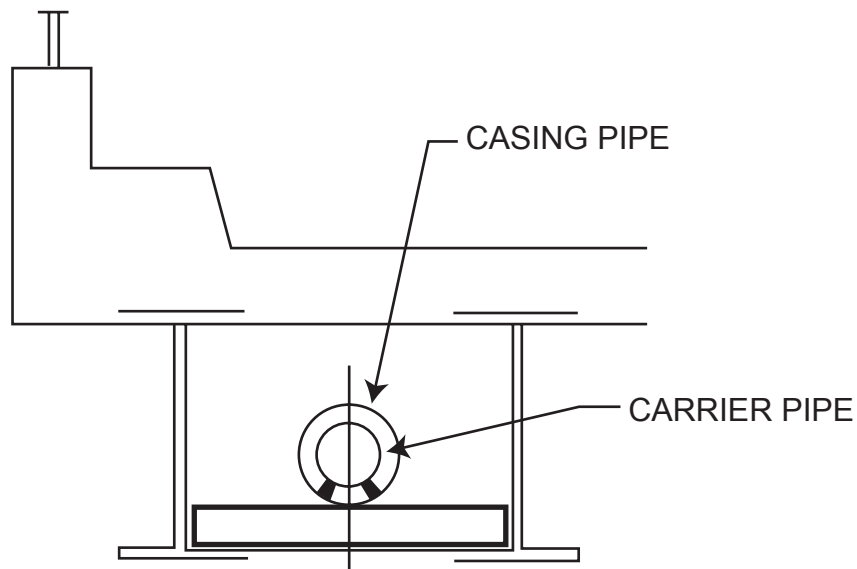
PLATE VII

ELEVATION & SECTION OF PIPELINE ON HIGHWAY BRIDGE OVER RAILROAD



ELEVATION

SCALE OF DRAWING TO BE SHOWN



SECTION B- B

SCALE OF DRAWING TO BE SHOWN

PLATE VIII

**TEST BORING LOG**

PROJECT: \_\_\_\_\_ HOLE NO.: \_\_\_\_\_

LOCATION: \_\_\_\_\_ SURFACE ELEVATION: \_\_\_\_\_

DATE STARTED: \_\_\_\_\_ DATE COMPLETED: \_\_\_\_\_ JOB NO.: \_\_\_\_\_

GROUND WATER DEPTH -  
WHILE DRILLING: \_\_\_\_\_

N - Number of blows to drive sampler 12" w/140# hammer  
falling 30" - ASTM D-1586 Standard Penetration Test

BEFORE CASING  
REMOVED: \_\_\_\_\_

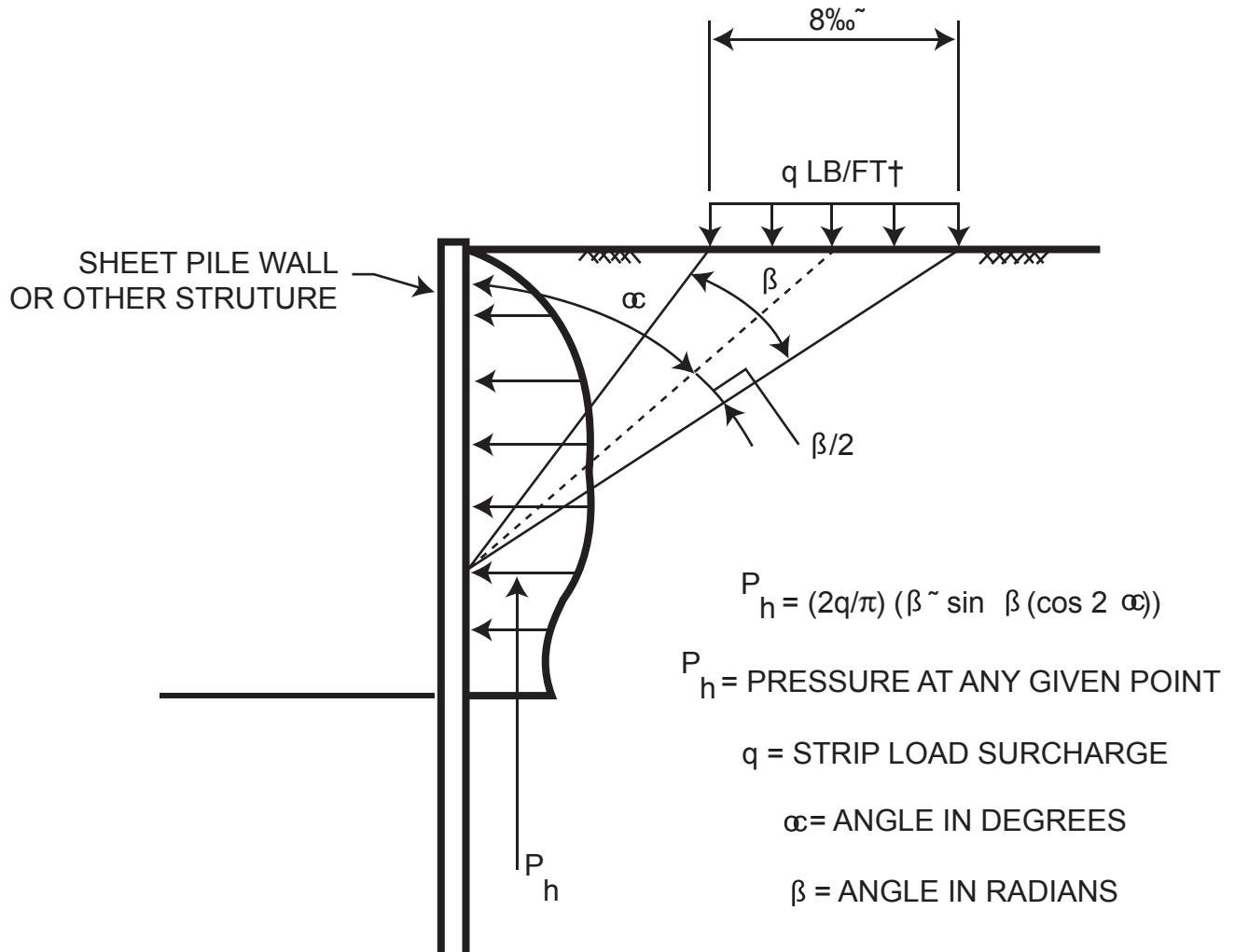
C - Number of blows to drive casing 12" w/140# hammer  
falling 30" OR 100% core recovery

AFTER CASING  
REMOVED: \_\_\_\_\_

PIPE INVERT ELEV	DEPTH	SAMPLE DEPTH		C	Sample Drive Record Per 8"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	5.0	0.0' -	1		6/14		Brown moist medium dense fine to coarse SAND & fine to mediu, GRAVEL, little silt	
		2.0'			14/19	28		
		2.0' -	2		9/15			
		4.0'			15/23	30		
		4.0' -	3		17/18			
	10.0	6.0'			11/21	29		6.0'
		6.0' -	4		9/6		Brown moist stiff silt	8.5'
		8.0'			5/7	11		
		8.0' -	5		10/12		Brown moist very stiff SILT, little fine to coarse SAND, little fine GRAVEL	
		10.0'			11/11	23		
	15.0	10.0' -	6		12/11			12.5'
11.3'				50- 3'				
						Gray dry hard silty weathered SHALE	15.0'	
						Top of Rock		
20.0	15.0' -	R1	Rec	BX CORE		Gray weathered steeply bedded SHALE		
	20.0'		48"	77%				
						Bottom of Boring	20.0'	

PLATE IX

LATERAL ELEPRESSURE DIAGRAM

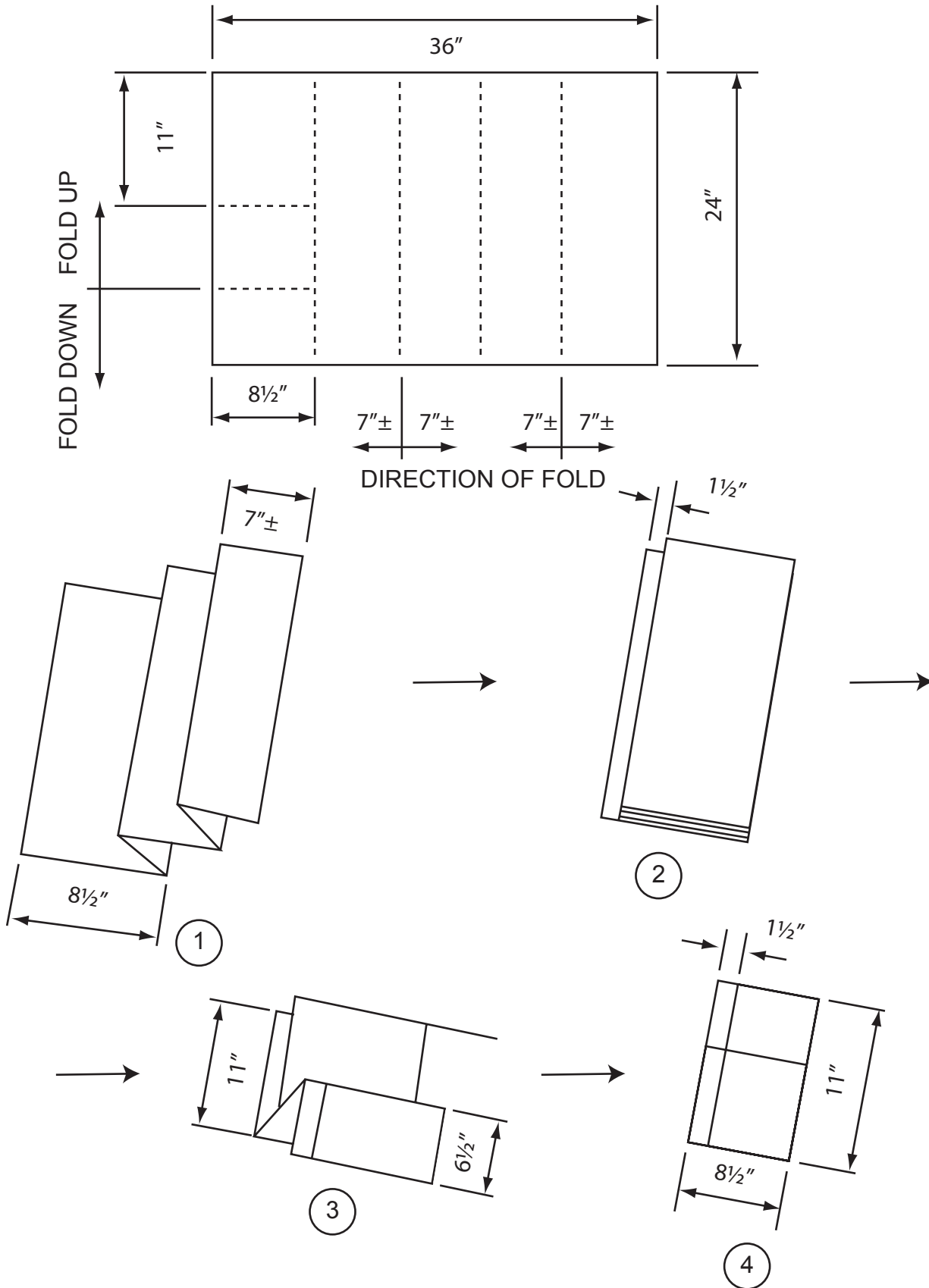


ELEVATION

LATERAL PRESSURE DUE TO STRIP LOAD

PLATE X

FOLDING OF PLANS



**PUBLICATION STANDARDS SOURCES**

ANSI            American National Standards Institute, Inc.  
                 1430 Broadway  
                 New York, NY 10018

AREA            American Railway Engineering Association  
                 50 F Street, N. W.  
                 Washington, DC 20001

ASTM            American Society for Testing and Materials  
                 1916 Race Street  
                 Philadelphia, PA 19103

AWWA            American Water Works Association, Inc.  
                 6666 West Quincy Avenue  
                 Denver, CO 80235

                 The National Association of Corrosion Engineers  
                 Houston, TX 77026

NOTE:        If other than AREA, ASTM or AWWA specifications are referred to for design, materials or workmanship on the plans and specifications for the work, then copies of the applicable sections of such other specifications referred to shall accompany the plans and specifications for the work.

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**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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6. Refer to the SAR Section 4, Anticipated Noise Levels. Noise generation from panel tracking motors is not included in this assessment. Indicate whether the ongoing independent noise study (represented to be completed December 2021) will include an assessment of noise generation from panel tracking motors. Provide the full independent noise study.

**Response: Noise from panel tracking motors was deemed insignificant and had not been considered in the original noise assessment. However, the ongoing independent noise study will consider noise from panel tracking motors and will be submitted once finalized.**

**Witness: Alexander Gregory – Sr Manager EPC**

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**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

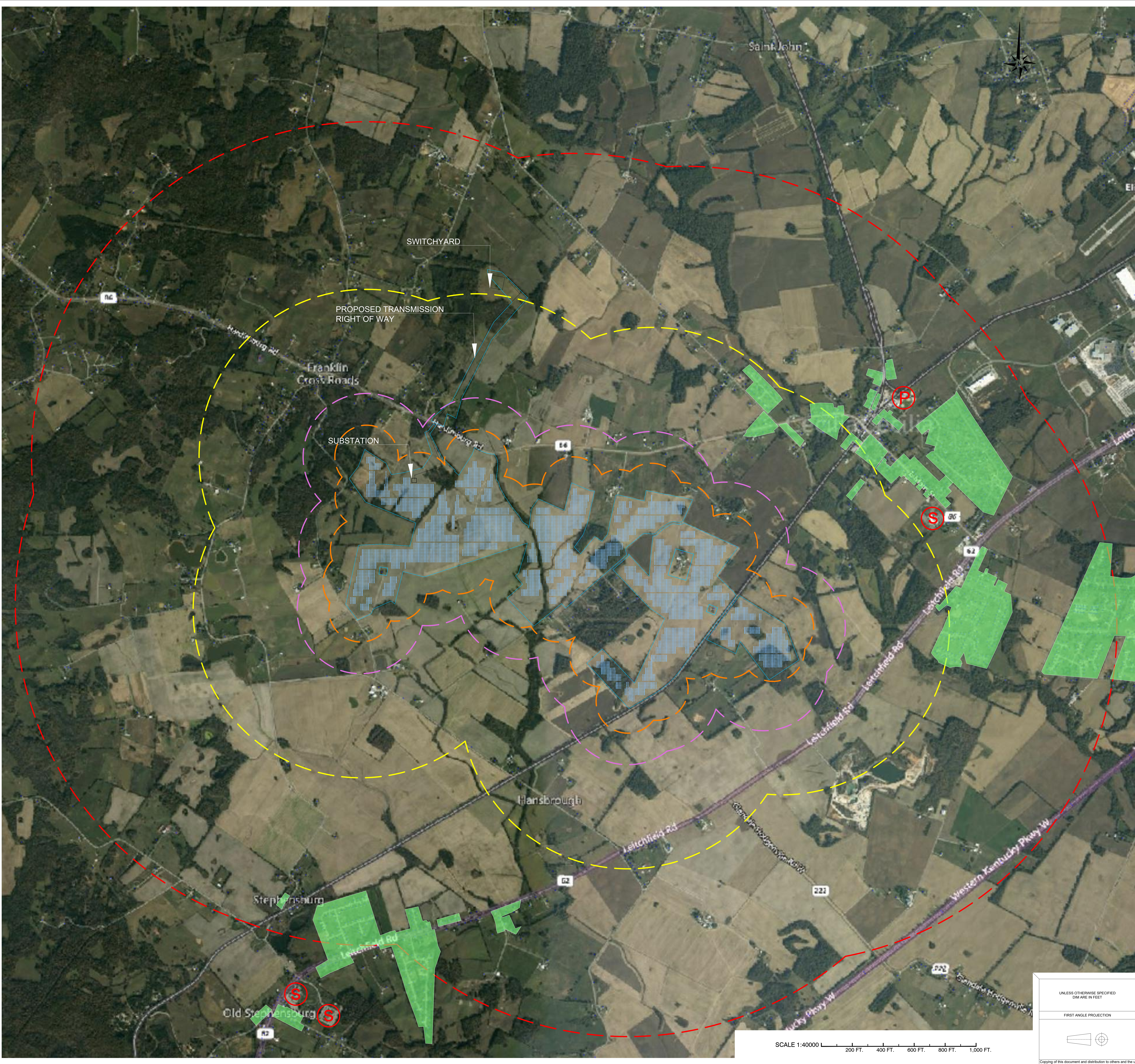
---

7. Refer to the new map provided in Rhudes Creek Solar's response to Siting Board's First Request for Information. The orange-dashed lines representing the 1,000-foot radius from the project bisect the easternmost solar arrays and nearly touch the array areas in a few other parts of the project layout. Explain this layout or modify the map as needed.

**Response:** Please see the revised vicinity map.

**Witness:** Jeff Chang, Planning & Engineering Manager





REVISION HISTORY			
REV	DESCRIPTION	DATE	NAME
0	ORIGINAL DRAWING	04 NOV 2021	KAMTHANE
0	UPDATED PER COMMENTS	06 DEC 2021	KAMTHANE

	1000 FEET RADIUS VICINITY		SCHOOL
	2000 FEET RADIUS VICINITY		PARK
	1 MILE RADIUS VICINITY		DWELLING
	2 MILE RADIUS VICINITY		SOLAR TRACKERS
	PROJECT BOUNDARY		

Exhibit DR 2-7

SCALE 1:40000 L 200 FT. 400 FT. 600 FT. 800 FT. 1,000 FT.

UNLESS OTHERWISE SPECIFIED DIM ARE IN FEET	NAME	DATE	ENGINEERING DESIGN	ibV Energy Partners 777 Brickell Ave. Suite 8520 Miami, FL, USA.	ibV energypartners ibV Energy Partners
	PREPARED BY	04 NOV 21			
	CHECKED BY	08 NOV 21			
FIRST ANGLE PROJECTION	APPROVED BY	08 NOV 21	TITLE		RHUDES CREEK SOLAR PROJECT
	DRAWING NO				USA.3210.M4.001. E   1
	SCALE 1:40000				SHEET 1 OF 1

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8. Refer to the SAR Section 2, Compatibility with Scenic Surroundings, page 6, where it states, "Preparation of a decommissioning plan to reclaim, revegetate, and restore the properties consistently with zoning classifications." Provide a copy of the decommissioning plan.

**Response: The decommissioning plan has not yet been developed for the Rhudes Creek Solar project. Rhudes Creek Solar can commit to the following:**

**Rhudes Creek Solar shall file a full and explicit decommissioning plan with the Siting Board upon completion. This plan shall commit Rhudes Creek Solar to removing all facility components, above-ground and below-ground, regardless of depth, from the project site. Upon its completion, this plan shall be filed with the Siting Board or its successors. The decommissioning plan shall be completed at least one month prior to construction of the Project.**

**Witness: Jeff Chang, Planning & Engineering Manager**

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**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

---

9. Explain what steps will be taken to avoid adverse effects to, or improve, the water run-off flow pattern currently occurring in front of and on the Fraser property at 3562 Hardinsburg Road. Include any measures designed to avoid interference with the free flow of runoff water from surrounding property that now exists. Address this both during construction and during operation of the facility and the newly built transmission line.

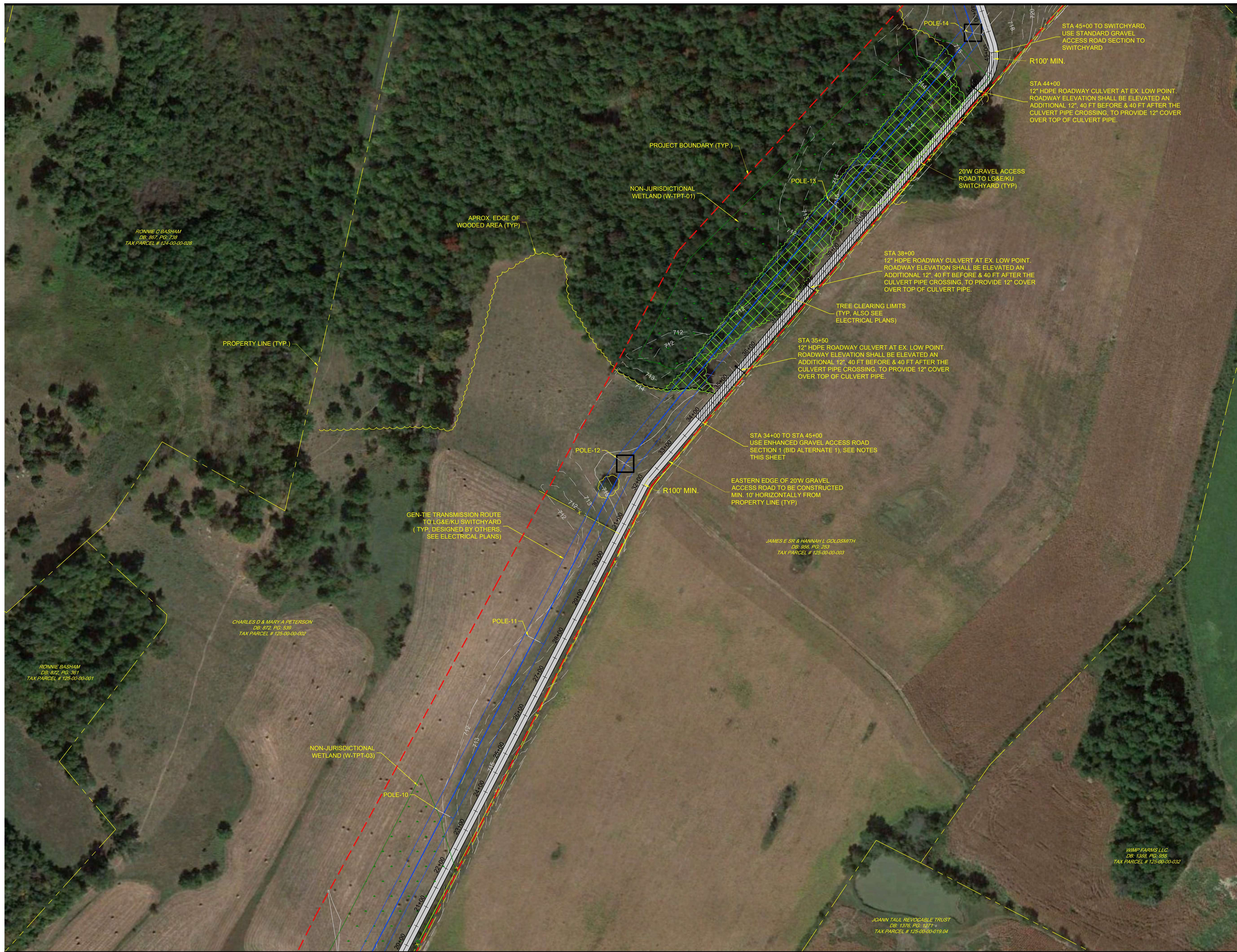
**Response: An 18-inch roadway culvert in the state highway right-of-way and a 12-inch culvert adjacent to the Fraser property have been planned to allow the free flow of runoff water. Please see page 4 and 5 of the attached Switchyard Access Plan Details.**

**Witness: Jeff Chang, Planning & Engineering Manager**

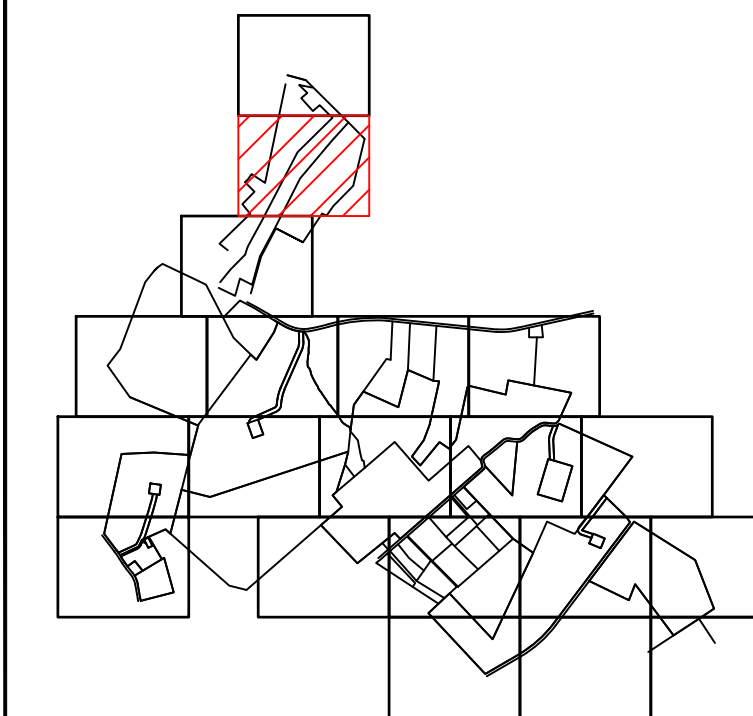




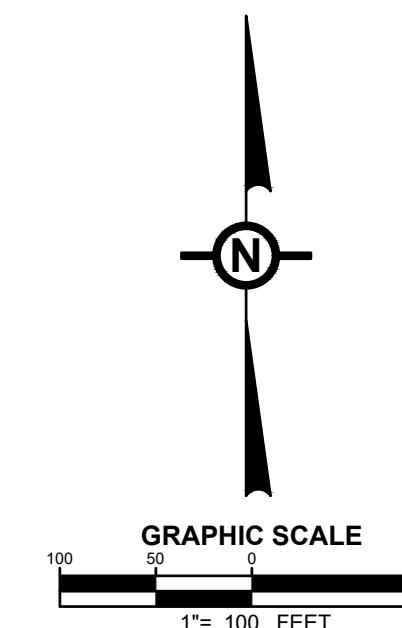
MATCHLINE (SEE SHEET 2)



MATCHLINE (SEE SHEET 4)



KEY MAP



NOTES:

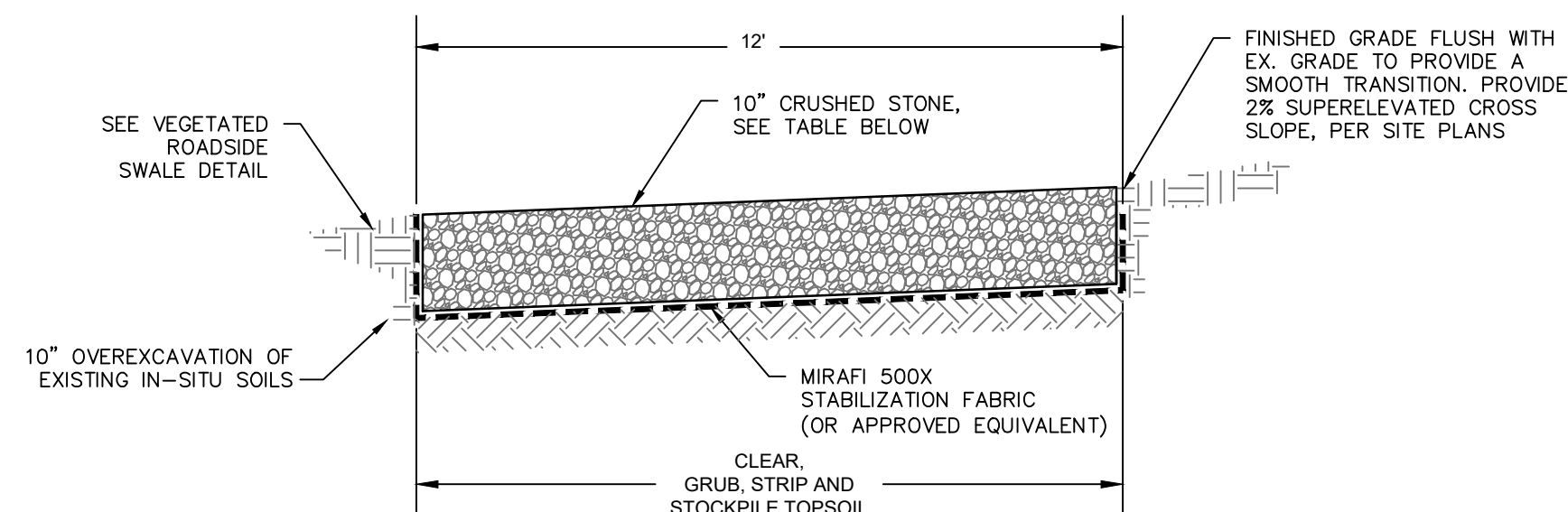
1. STA. 34+00 TO STA. 45+00, CONTRACTOR SHALL USE ENHANCED GRAVEL ACCESS ROAD SECTION 1 (BID ALTERNATE 1). IN THE EVENT THAT THE EX. IN-SITU SOILS HAVE LESS SOIL BEARING CAPACITY THAN EXPECTED DURING THE CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL USE THE ENHANCED GRAVEL ACCESS ROAD SECTION 2 (BID ALTERNATE 2) INSTEAD (TO BE DETERMINED BY THE CONSTRUCTION MANAGER ONLY).
2. ENHANCED GRAVEL ROAD SECTION LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE DETERMINED IN FIELD BY CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.
3. ACTUAL FIELD LOCATIONS (SUBJECT TO CHANGE BY CONSTRUCTION MANAGER) OF CULVERT PIPES SHALL BE INSTALLED AT THE LOWEST POINTS OF ELEVATION ALONG THE GRAVEL ACCESS ROAD.

**TRC** TRC Engineers, Inc.  
650 Suffolk Street  
Lowell, MA 01854  
Tel: 978-970-5600  
www.trcsolutions.com

DRAWING TITLE:  
**GEN-TIE ROUTE  
SUBSTATION ACCESS**

SCALE:	1" = 100'
DATE:	11/29/21
DRAWN BY:	
CHECKED BY:	
PROJECT:	
DRAWING NO.:	

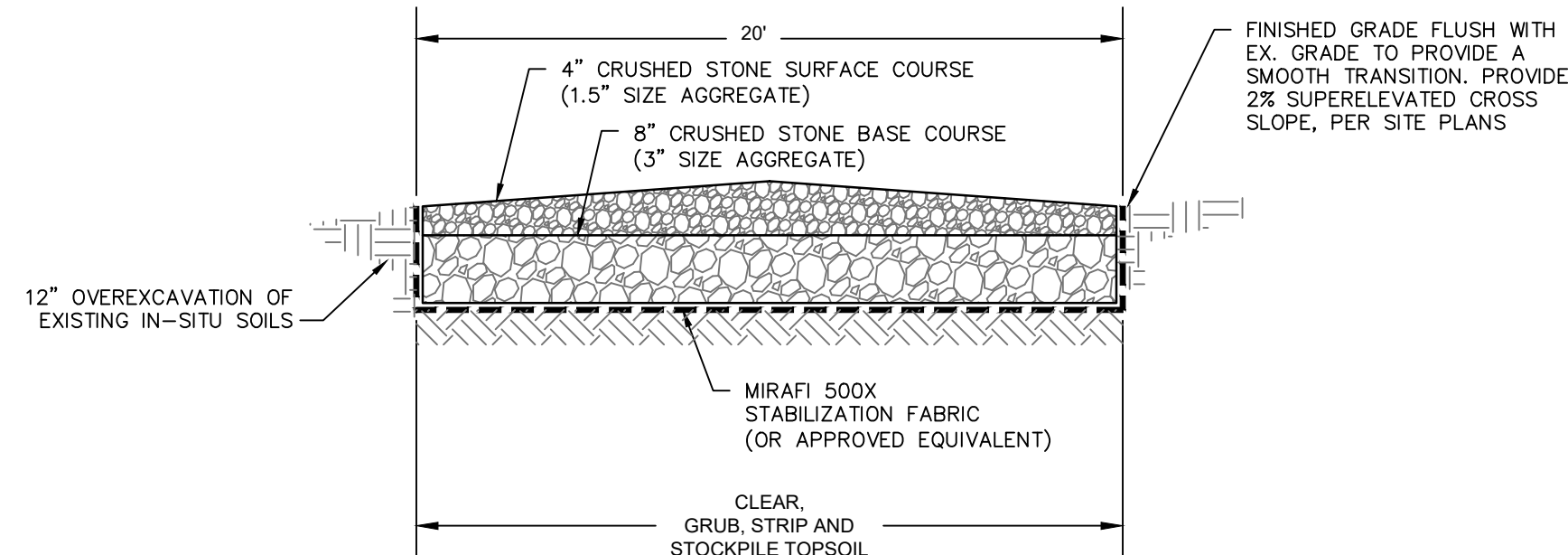




- CONSTRUCTION NOTES:**
- SUBGRADE SHALL BE COMPACTED TO 95% OF ASTM D1557.
  - AGGREGATE BACKFILL SHALL BE CRUSHED STONE AND FREE FROM A DETRIMENTAL QUANTITY OF THIN, FLAT, ELONGATED, OR OTHER OBJECTIONABLE PIECES.
  - PREPARE SUBSURFACE BY REMOVING THE ORGANIC AND PROOF ROLLING PRIOR TO GEOTEXTILE INSTALLATION.

GRADING REQUIREMENTS	
SIEVE DESIGNATION	PERCENTAGE BY MASS PASSING SQUARE MESH SIEVES
1 1/2-INCH	100
3/4-INCH	55-90
NO. 4	25-50
NO. 50	5-20
NO. 200	3-10

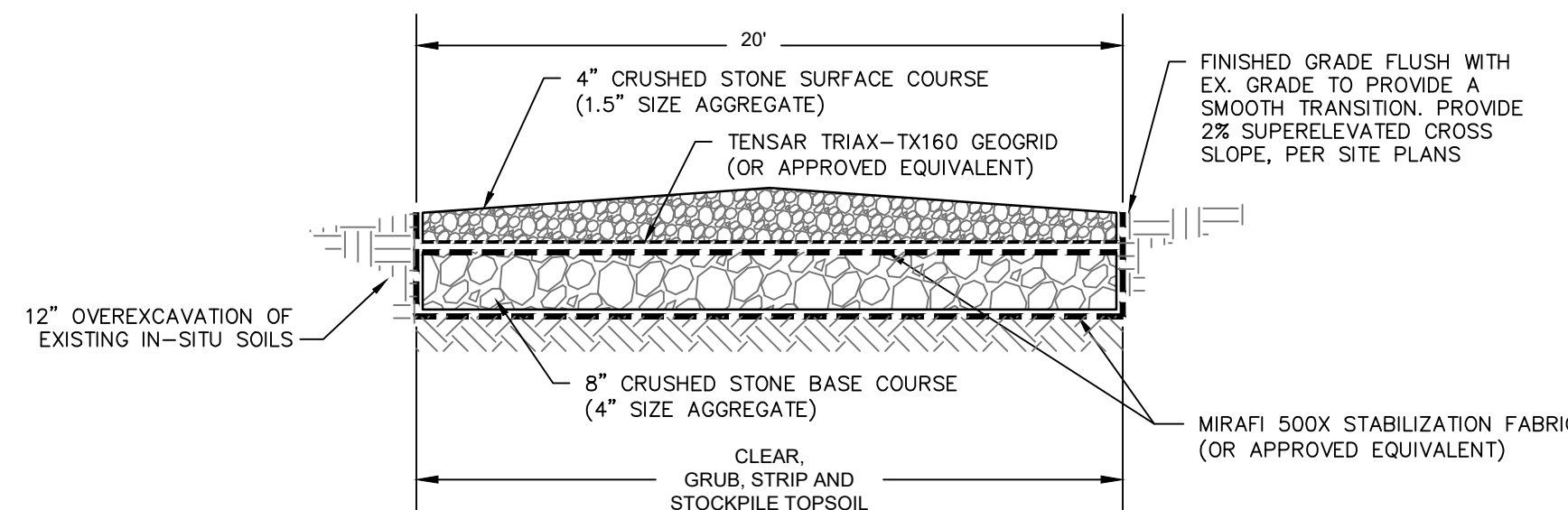
**STANDARD GRAVEL ACCESS ROAD SECTION**  
NOT TO SCALE



- CONSTRUCTION NOTES:**
- SUBGRADE SHALL BE COMPACTED TO 95% OF ASTM D1557.
  - AGGREGATE BACKFILL SHALL BE CRUSHED STONE AND FREE FROM A DETRIMENTAL QUANTITY OF THIN, FLAT, ELONGATED, OR OTHER OBJECTIONABLE PIECES.
  - PREPARE SUBSURFACE BY REMOVING THE ORGANIC AND PROOF ROLLING PRIOR TO GEOTEXTILE INSTALLATION.

**STA. 0+00 TO STA. 34+00 & STA. 45+00 TO SWITCHYARD**  
**STANDARD GRAVEL ACCESS ROAD SECTION TO SWITCHYARD**  
**(LG&E/KU DESIGN STANDARD - BASE BID)**

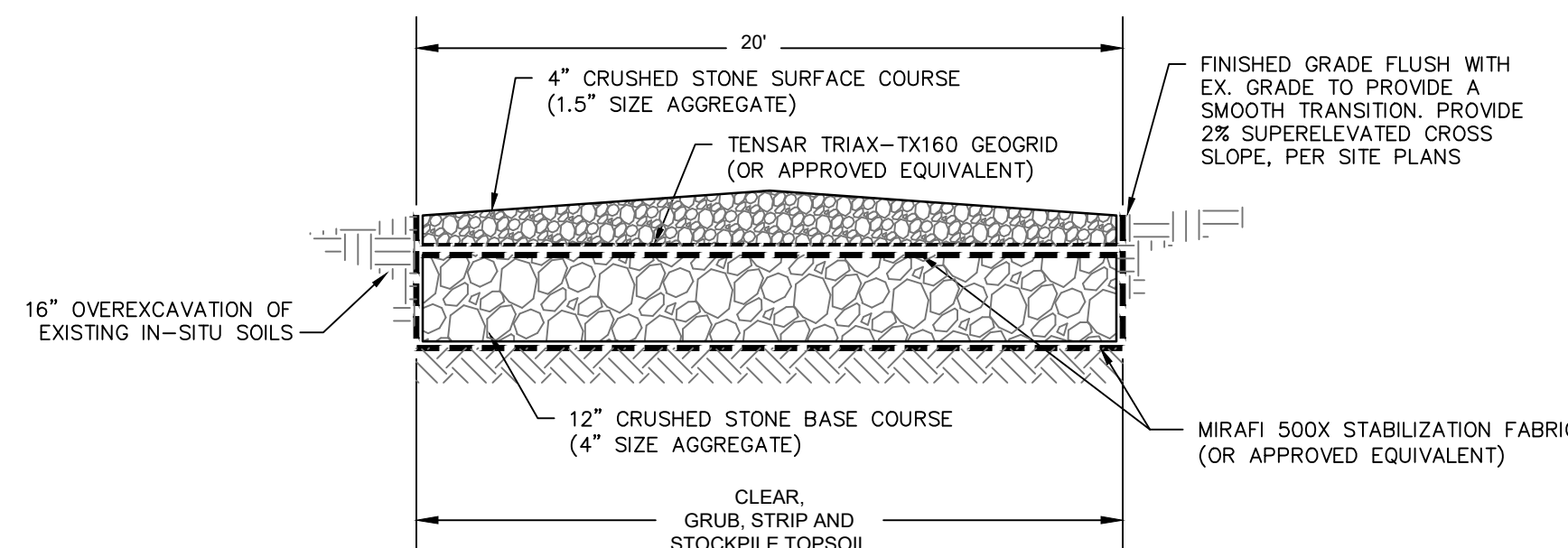
NOT TO SCALE



- CONSTRUCTION NOTES:**
- SUBGRADE SHALL BE COMPACTED TO 95% OF ASTM D1557.
  - AGGREGATE BACKFILL SHALL BE CRUSHED STONE AND FREE FROM A DETRIMENTAL QUANTITY OF THIN, FLAT, ELONGATED, OR OTHER OBJECTIONABLE PIECES.
  - PREPARE SUBSURFACE BY REMOVING THE ORGANIC AND PROOF ROLLING PRIOR TO GEOTEXTILE INSTALLATION.

**STA. 34+00 TO STA. 45+00**  
**ENHANCED GRAVEL ACCESS ROAD SECTION 1**  
**(LG&E/KU DESIGN STANDARD - BID ALTERNATE 1)**

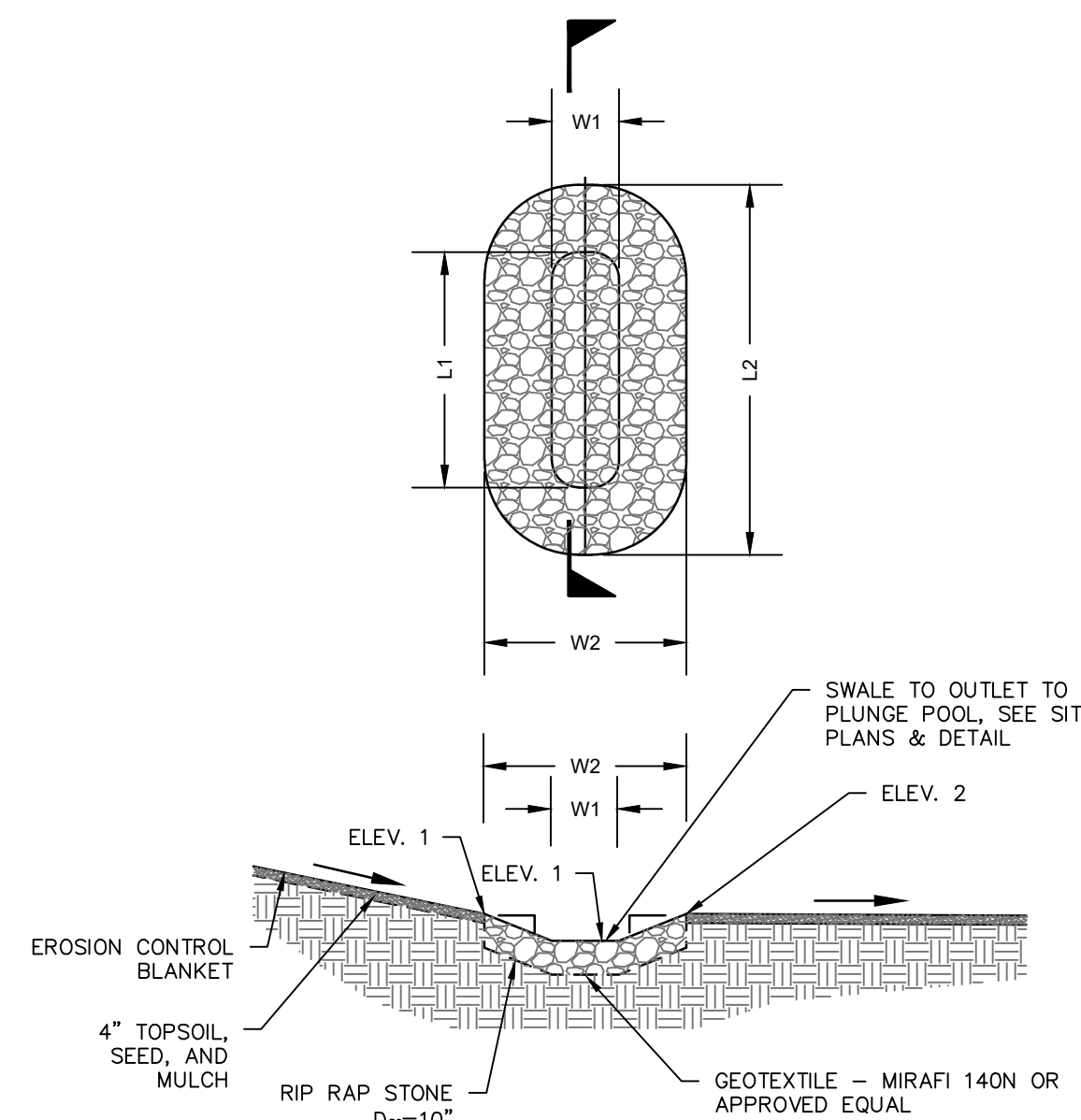
NOT TO SCALE



- CONSTRUCTION NOTES:**
- 34+00 TO STA. 45+00, CONTRACTOR SHALL USE "ENHANCED GRAVEL ACCESS ROAD SECTION 1 (BID ALTERNATE 1)". IN THE EVENT THAT THE IN-SITU SOILS HAVE LESS SOIL BEARING CAPACITY THAN EXPECTED DURING THE CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL USE THE "ENHANCED GRAVEL ACCESS ROAD SECTION 2 (BID ALTERNATE 2)" INSTEAD (TO BE DETERMINED BY THE CONSTRUCTION MANAGER ONLY).
  - SUBGRADE SHALL BE COMPACTED TO 95% OF ASTM D1557.
  - AGGREGATE BACKFILL SHALL BE CRUSHED STONE AND FREE FROM A DETRIMENTAL QUANTITY OF THIN, FLAT, ELONGATED, OR OTHER OBJECTIONABLE PIECES.
  - PREPARE SUBSURFACE BY REMOVING THE ORGANIC AND PROOF ROLLING PRIOR TO GEOTEXTILE INSTALLATION.

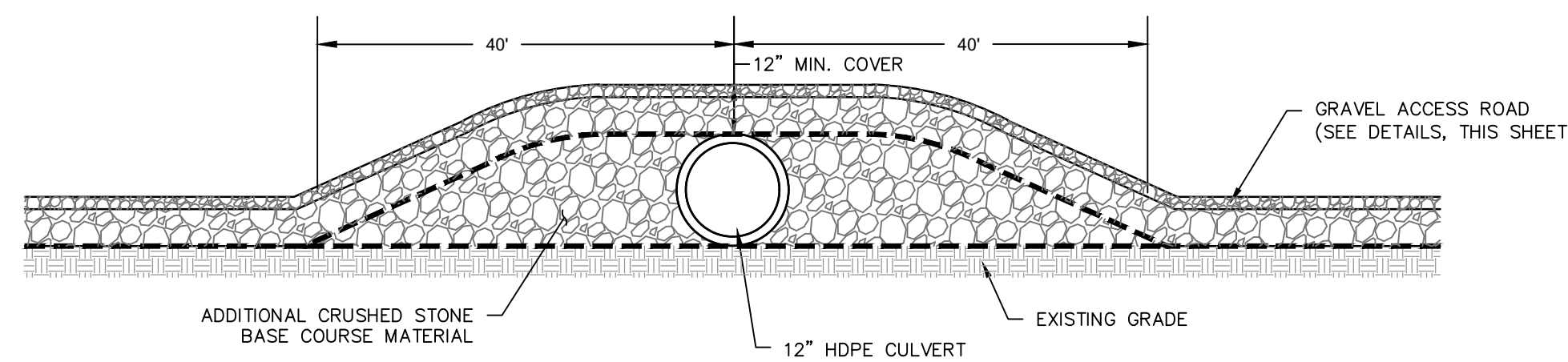
**STA. 34+00 TO STA. 45+00**  
**ENHANCED GRAVEL ACCESS ROAD SECTION 2**  
**(LG&E/KU DESIGN STANDARD - BID ALTERNATE 2)**

NOT TO SCALE



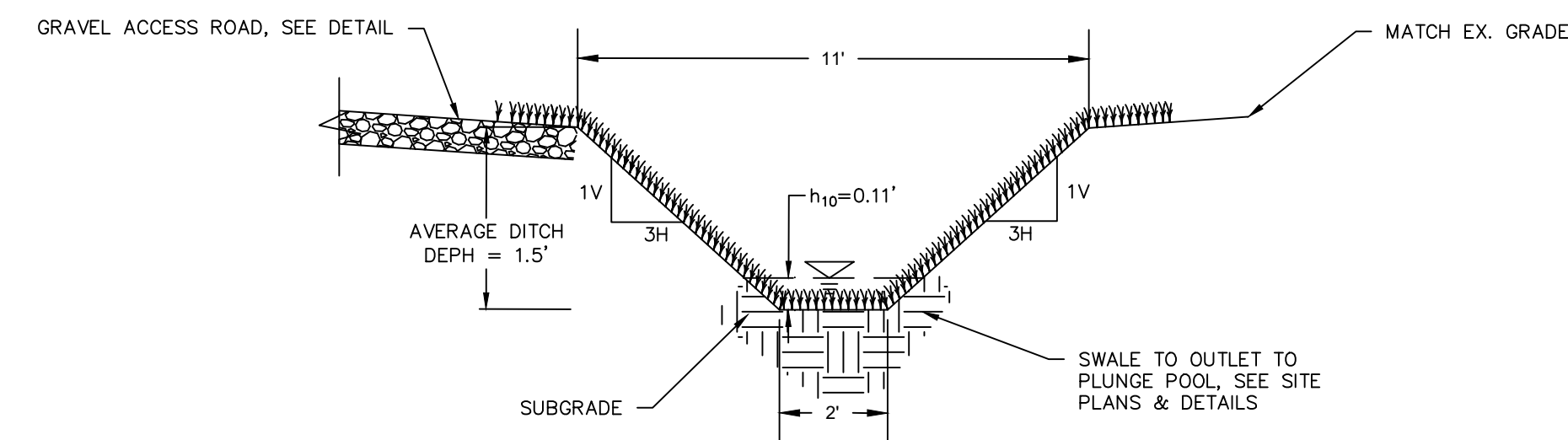
PLUNGE POOL TABLE						
ID	L1	W1	ELEV.1	L2	W2	ELEV.2
PP-1	8	3	709.1	12	6	709.1

**PLUNGE POOL DETAIL**  
SCALE: N.T.S.



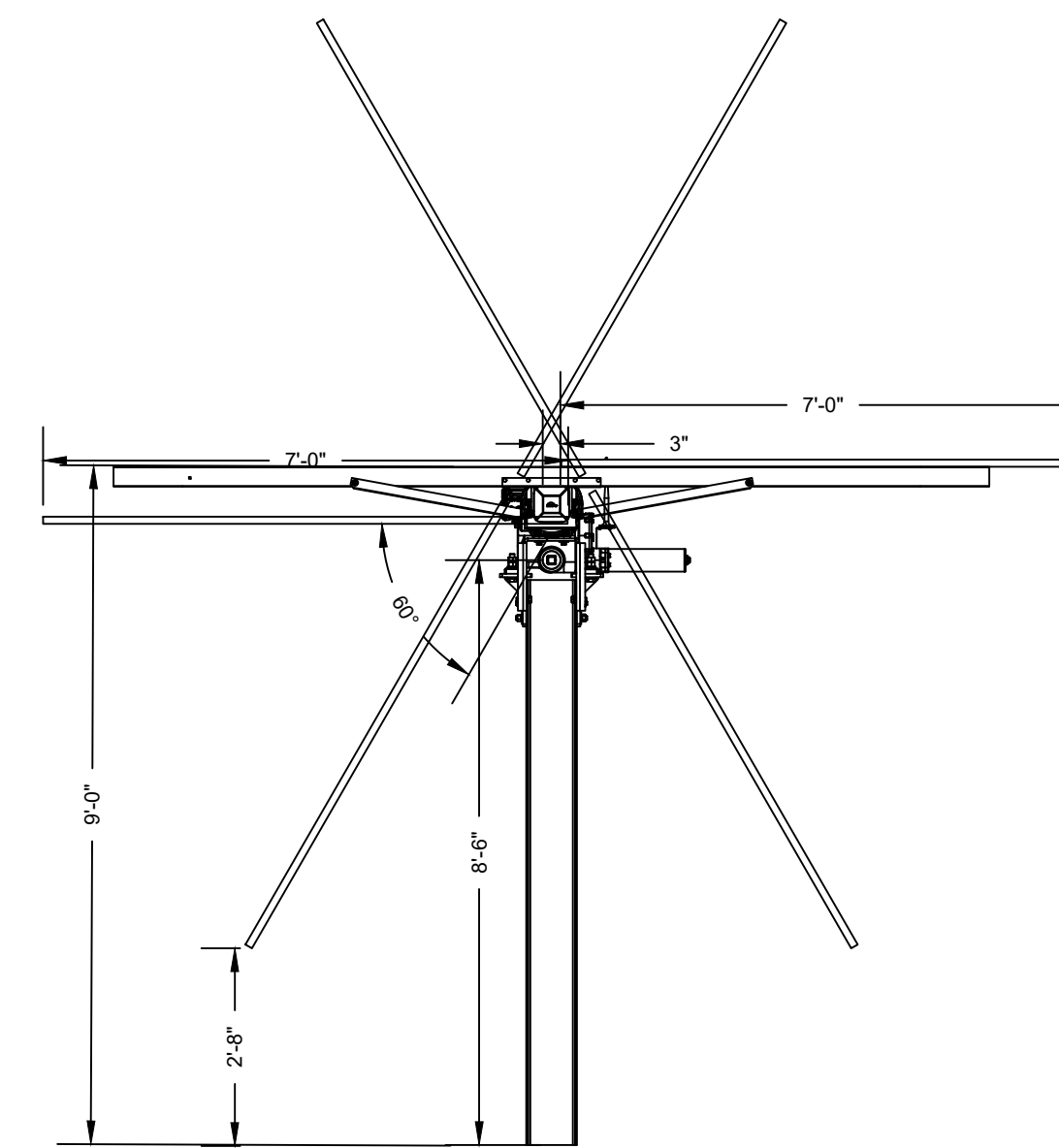
- NOTES:**
- CROSS SECTION SHOWN AT ACCESS ROAD CENTERLINE.
  - ACTUAL FIELD LOCATIONS (SUBJECT TO CHANGE BY CONSTRUCTION MANAGER) OF CULVERT PIPES SHALL BE INSTALLED AT THE LOWEST POINTS OF ELEVATION ALONG THE GRAVEL ACCESS ROAD.

**CROSS SECTION - ROADWAY CULVERT**  
NOT TO SCALE



- NOTE:**
- ALL SWALES WILL BE LINED WITH NORTH AMERICA GREEN'S NAG-P-200 EROSION CONTROL BLANKET OR EQUIVALENT.

**VEGETATED ROADSIDE SWALE DETAIL**  
SCALE: N.T.S.



**SOLAR TRACKER PANEL DETAIL**  
NOT TO SCALE

STATE & COUNTY DRIVEWAY ACCESS CULVERTS										
ID	Length (ft)	Diameter (in)	Embedment	Inlet Elevation	Outlet Elevation	Slope (%)	Outlet Protection Length (5'D), ft	Outlet Protection Width (3'D), ft	D50 Size	Pipe Material
SR-86, Culvert 1	36	18	N/A	710	709.5	1.39	7.5	4.5	R-3, 6"	RCP
SR-86, Culvert 2	36	18	N/A	709.99	709.57	1.17	7.5	4.5	R-3, 6"	RCP
County Access 1	36	18	N/A	735.25	734.78	1.36	7.5	4.5	R-3, 6"	RCP
County Access 2	36	18	N/A	715.5	715.12	1.06	7.5	4.5	R-3, 6"	RCP

INTERNAL STREAM CROSSING CULVERTS										
ID	Length (ft)	Diameter (in)	EMBEDMENT (ft)	Inlet Elevation	Outlet Elevation	Slope (%)	Outlet Protection Length	Outlet Protection Width (3'D)	EMBEDDED MATERIAL	Pipe Material
STREAM CROSSING #1	30	30	6	702.1	701.92	0.60	N/A	N/A	MATCH STREAM BOTTOM SUBSTRATE	HDPE
STREAM CROSSING #2	30	60	12	704.7	702.07	8.77	N/A	N/A	MATCH STREAM BOTTOM SUBSTRATE	HDPE
STREAM CROSSING #3	30	36	7.5	708.5	708.4	0.33	N/A	N/A	MATCH STREAM BOTTOM SUBSTRATE	HDPE
STREAM CROSSING #4	30	45	9	707.22	706.84	1.27	N/A	N/A	MATCH STREAM BOTTOM SUBSTRATE	HDPE
STREAM CROSSING #5	30	30	6	717.5	716.66	2.80	N/A	N/A	MATCH STREAM BOTTOM SUBSTRATE	HDPE

INTERNAL ROAD CROSSING CULVERTS										
ID	Length (ft)	Diameter (in)	Embedment	Inlet Elevation	Outlet Elevation	Slope (%)	Outlet Protection Length (5'D)	Outlet Protection Width (3'D), ft	D50 Size	Pipe Material
Int-6, C-1	30	18	N/A	734.3	734.2	0.33	7.5	4.5	R-3, 6"	HDPE
Int-6, C-2	25	30	N/A	721.1	720.9	0.80	12.5	7.5	R-4, 9"	HDPE
Int-6, C-3	23	18	N/A	721.1	721	0.43	7.5	4.5	R-3, 6"	HDPE
Int-6, C-4	26	15	N/A	724.7	724.6	0.38	6.25	3.75	R-3, 6"	HDPE
Int-5, C-1	22	15	N/A	732.4	732.25	0.68	6.25	3.75	R-3, 6"	HDPE
Int-5, C-2	22	24	N/A	712.5	712.38	0.55	10	6	R-4, 9"	HDPE
Int-7, C-1	20	18	N/A	725.16	725	0.80	7.5	4.5	R-3, 6"	HDPE
Int-9, C-1	25	18	N/A	731.2	731.1	0.40	7.5	4.5	R-3, 6"	HDPE
Int-9, C-2	25	18	N/A	722.5	722.4	0.40	7.5	4.5	R-3, 6"	HDPE
Int-9, C-3	25	15	N/A	716.6	716.4	0.80	6.25	3.75	R-3, 6"	HDPE
Int-10, C-1	25	18	N/A	726.4	726.1	1.20	7.5	4.5	R-3, 6"	HDPE
Int-10, C-2	15	18	N/A	721	720.9	0.67	7.5	4.5	R-3, 6"	HDPE
Int-10, C-3	25	18	N/A	716	715.84	0.64	7.5	4.5	R-3, 6"	HDPE
Int-14, C-1	30	18	N/A	716	715.8	0.67	7.5	4.5	R-3, 6"	HDPE
Int-14, C-2	30	15	N/A	730.5	730.3	0.67	6.25	3.75	R-3, 6"	HDPE
Int-14, C-3	25	15	N/A	743.5	743.18	1.28	6.25	3.75	R-3, 6"	HDPE

**CULVERT SUMMARY TABLE**

NO.	REVISION	DATE
2	PRELIMINARY 90% CUP SUBMISSION	05/17/2021
1	PRELIMINARY CUP SUBMISSION	02/23/2021

Property Owners:  
EUGENE M & DOROTHY J HILL  
CLAYTON & GERALDINE GREY  
KERBY ADAM GREY  
CLAYTON GREY  
CLAYTON GREY LIVING TRUST  
CHARLES D & MARY A PETERSON



Applicant:  
**ibV ENERGY PARTNERS**  
984.238.4284  
JEFFREY CHANG  
JEFFREY.CHANG@IBVENERGY.COM  
777 BRICKELL AVE  
SUITE 500  
MIAMI, FL 33131

**DEVELOPMENT PLANS**  
**RHUDES CREEK**  
**SOLAR PROJECT**  
HARDIN COUNTY, KY

DRAWING TITLE:  
**SITE DETAILS**

ISSUE FOR PERMITTING ONLY. NOT INTENDED FOR CONSTRUCTION OR BIDDING PURPOSES.

SCALE: AS SHOWN  
DATE: 11/29/21  
DRAWN BY: TRC  
CHECKED BY: DTB  
PROJECT: 363193  
DRAWING NO.: **C-302**



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**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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10. Refer to the SAR, Attachment 13, Final Stormwater Pollution Prevention Plan, page 13. Regarding post-construction stormwater control, the document states, "The Project does not propose any structural BMPs since the post-development conditions vastly improve the ground cover compared to pre-development conditions." Explain how post-development conditions will be improved from the standpoint of stormwater management relative to existing conditions.

**Response: The transition from barren and dusty row crops to managed turf will greatly improve the land's ability to percolate stormwater. Grass growth all over the site and the accompanying root system will both soak up water and slow down any runoff flow previously experienced on this ground.**

**Witness: Alexander Gregory – Sr Manager EPC**

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11. Refer to the SAR, Attachment 13, page17, where it states, "A Qualified Inspector shall conduct regular site inspections for the implementation of this SWPPP through final stabilization of the Project Site. Inspections shall occur at an interval set forth in the Construction General Permit." How frequently will the site be inspected during the construction phase?

**Response: The site will be inspected daily with multiple observations and additional inspections being performed per day after major rain events.**

**Witness: Alexander Gregory – Sr Manager EPC**

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**RHUDES CREEK SOLAR, LLC**  
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12. How frequently will the site be inspected for stormwater management post- construction?

**Response:** The site will be inspected per state and local standards after construction is completed until final stabilization has occurred and permits have been formally closed out. Typically, the site will be inspected once per week or within 24 hours after a rain event of a quarter of an inch or more.

**Witness:** Alexander Gregory – Sr Manager EPC

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13. Describe any conversations with individual adjacent landowners regarding stormwater concerns, including the specific nature of their concerns and Rhudes Creek Solar's plans to address those concerns.

**Response:** Along with conversations with the Frasers, some of which are documented in Attachment F to the Application, numerous meetings and site visits have been conducted with Russell and Tiffani Tucker. A correspondence email and presentation are attached hereto for reference.

- July 7, 2021 – ibV Energy Partners' Planning & Engineering Manager, Jeff Chang, accompanied by landscape architect visited Tiffani and Russell Tucker to discuss landscaping and stormwater concerns.
- August 31, 2021 – ibV Energy Partners' Jeff Chang provided before and after visualizations of landscaping to the Tuckers.
- September 2, 2021 – ibV Energy Partners' Jeff Chang provided a detailed assessment and presentation of pre- and post-development drainage conditions to the Tuckers.
- October 15, 2021 – ibV Energy Partners' Jeff Chang, DJ Kamthane, and Jack Leesnitzer accompanied by TRC's civil engineers met Russell and Tiffani Tucker on their property to discuss and review existing stormwater conditions.
- November 9, 2021 – ibV Energy Partners' Jeff Chang accompanied by Hardin County Engineer, Charlie Allen, and Hardin County Assistant Road Supervisor, Michael Steck, met Russell Tucker on his property

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**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

---

**to discuss concerns over the county road right-of-way drainage conditions. The Road Department flagged the existing roadside ditch for further review.**

**Witness: Jeff Chang, Planning & Engineering Manager**

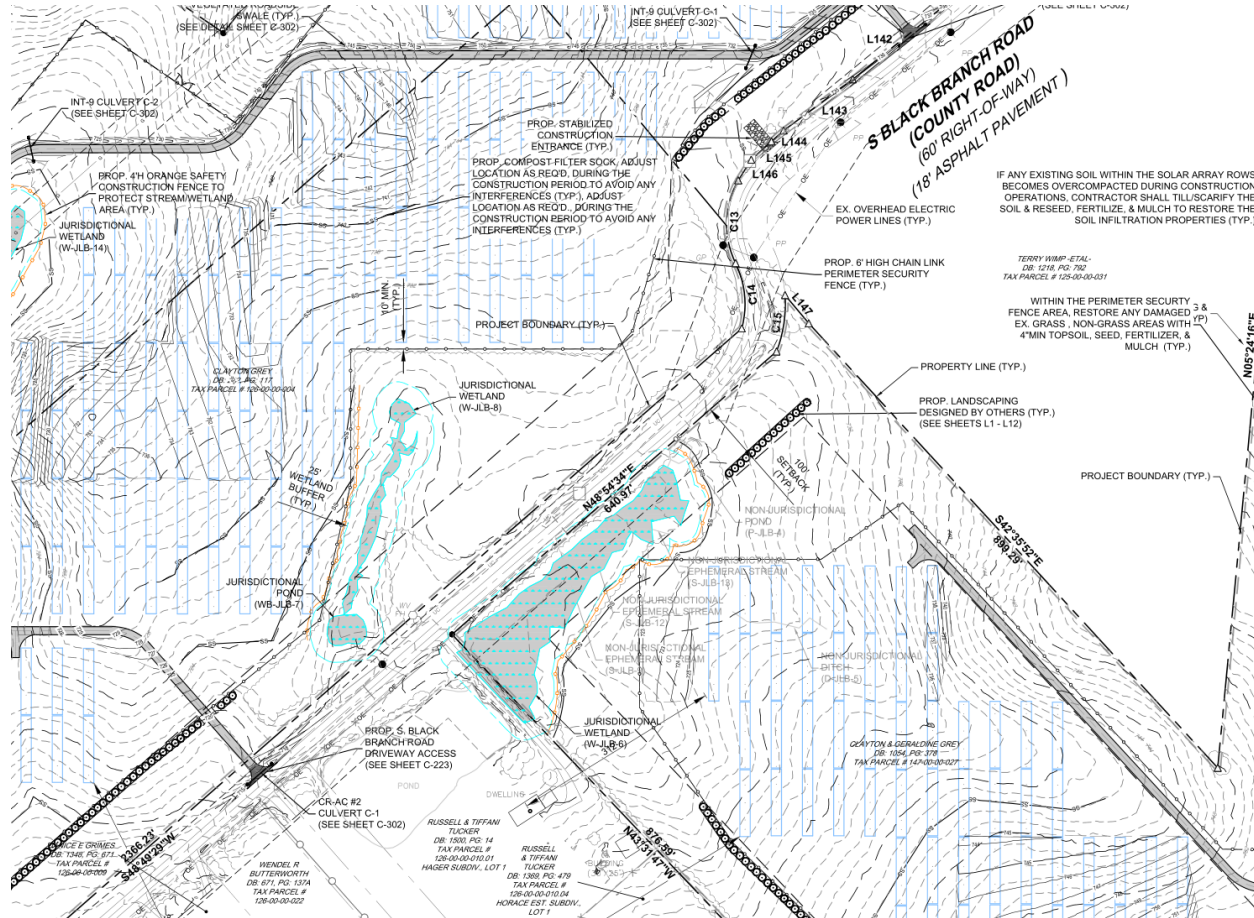
# Tucker's Pond Pre- and Post- Development Drainage Conditions

Jeff Chang  
Planning & Engineering Manager  
ibV Energy Partners  
2<sup>nd</sup> September 2021

# Existing Conditions

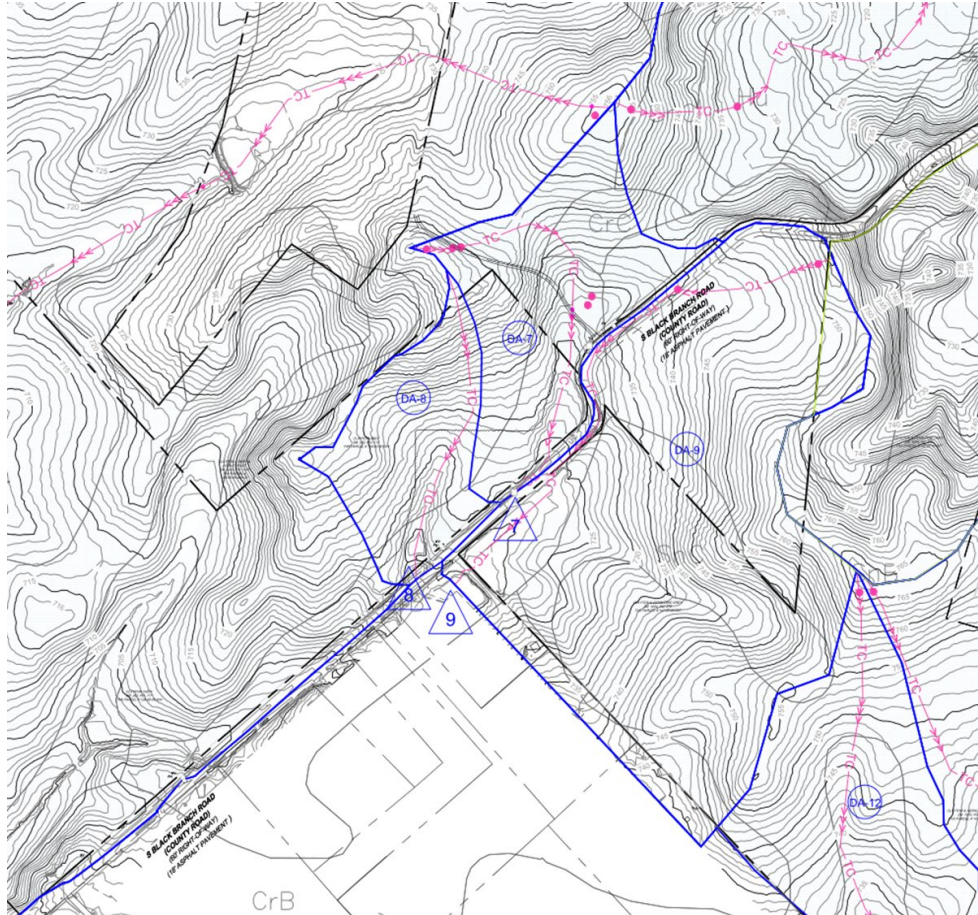


# Site Plans





# Pre-Development Drainage Conditions



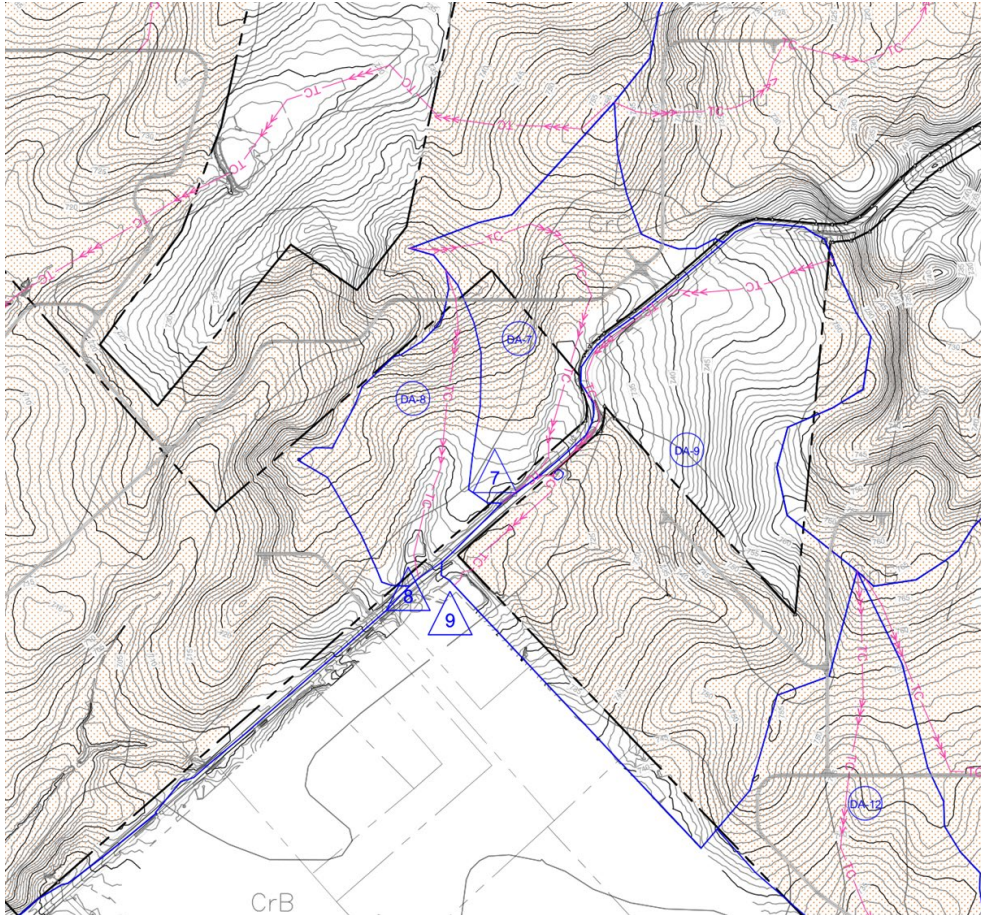
Curve Number – the ability of the area to absorb rainfall due to soil and land use characteristics

Time of Concentration - the time it takes for rainfall to flow from the farthest point of a drainage area to the outlet

**PRE DEVELOPMENT DRAINAGE AREAS, CN AND TC VALUES**

Drainage Boundary	Total Area, Ac.	Composite CN	Tc, Min.
1	26.67	77	33.4
2	5.38	68	20.2
3	67.48	75	41.7
4	24.88	73	18.5
5	87.52	76	29.1
6	246.82	78	28.8
7	12.29	71	32.9
8	7.84	60	20.4
9	37.59	70	12.6
10	60.17	72	29.8
11	31.38	72	23.7
12	15.49	75	24.3

# Post-Development Drainage Conditions



POST DEVELOPMENT DRAINAGE AREAS, CN  
AND TC VALUES

Drainage Boundary	Total Area, Ac.	Composite CN	Tc, Min.
1	26.67	73	34.7
2	5.38	63	22.7
3	67.48	69	43.2
4	24.88	69	20.7
5	87.52	69	30.7
6	246.87	74	47.1
7	13.02	66	36.2
8	7.84	62	18.4
9	37.59	67	14.2
10	60.17	65	32
11	31.38	66	24.9
12	15.48	68	26.2

# Peak Discharge during Rainfall Events

- Proposed construction on this site will significantly reduce the curve number (CN) of land in all areas except for subcatchment DA-8, 100-yr; 6-hr storm. Under post developed conditions, there is a 0.17 cfs (3.7%) increase from DA-8.
- However the remaining subcatchments (DA-7 and DA-9) that flow into the same neighboring pond has considerably reduced the post runoff flows.
- Thus, the post-construction runoff affecting the neighboring pond will be reduced by a total of 25.44 cfs (15.6%) during the 100-yr; 6-hr storm.

Table 3 - Peak Discharge Rate (cfs) Comparison

Study Point	10-Year; 1-Hour Rainfall Event		100-Year; 1-Hour Rainfall Event		100-Year; 6-Hour Rainfall Event	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
1	8.01	4.70	19.73	14.33	72.89	60.67
2	0.57	0.12	2.59	1.31	13.67	9.95
3	13.61	5.40	37.11	21.55	145.92	108.91
4	6.54	3.21	20.05	13.05	84.79	65.51
5	25.66	8.65	65.78	35.73	250.85	180.48
6	104.08	61.28	246.43	175.80	882.40	715.41
7	1.66	0.61	5.79	3.41	26.60	20.50
8	0.00	0.00	0.16	0.14	4.59	4.76*
9	7.88	3.90	27.95	20.34	131.53	112.02
10	10.23	2.26	32.69	15.26	144.66	96.65
11	6.26	1.79	20.07	10.72	88.14	64.77
12	4.60	1.39	13.31	6.39	48.41	34.12
13	28.15	14.01	68.36	44.34	253.20	194.35
14	20.64	13.40	43.89	33.11	145.23	122.08
15	17.73	5.35	47.65	24.21	187.66	130.95
16	5.33	1.97	14.10	8.20	55.46	41.40
17	6.64	2.87	19.19	11.73	78.21	59.27
18	3.46	0.15	13.91	4.09	69.79	40.77
19	0.05	0.05	1.05	0.93	8.75	7.84
20	0.59	0.13	2.90	1.72	16.35	12.59
21	2.04	0.27	9.46	3.86	49.63	33.15

## Exhibit DR 2-13b

**From:** [Jeffrey Chang](#)  
**To:** [REDACTED]  
**Cc:** [Robin Saiz](#); [Butler, Daniel](#)  
**Subject:** Tucker's Pond Pre- and Post-Development Runoff Conditions  
**Date:** Thursday, September 2, 2021 4:25:00 PM  
**Attachments:** [Tucker's Pond Pre- and Post-Development Drainage Conditions.pdf](#)

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Hi Russell and Tiffani, good afternoon. I had a much closer look at the pre- and post-conditions of runoff to your pond.

- In essence, there are 3 drainage areas that feed into your pond.
  - 2 areas across South Black Branch totaling 20 acres
  - 38-acre portion of the farmland abutting your property
- We looked at the ability for each of the 3 drainage areas to absorb water before and after the project.
- To do this, we evaluated the soil, land use, and time for water to flow from the farthest point of each area.
- The two larger areas on either side of South Black Branch are significantly improved, while the third smallest area is slightly worsened.
- We then modeled three major rainfall events.
  - 10 year occurrence with a 1 hour duration
  - 100 year occurrence with a 1 hour duration
  - 100 year occurrence with a 6 hour duration
- There is no additional runoff expected for all 3 drainage areas during the 1 hour storms.
- The smallest drainage area will have a slight uptick during the 6 hour storm. However, the runoff from the two larger drainage areas are significantly reduced to offset the slight uptick.

Hope this helps, and please give me a call or shoot a text if you want to talk through some more.

Best,

Jeff

[Jeffrey C. Chang](#)  
Planning & Engineering Manager

ibV Energy Partners  
777 Brickell Ave. Suite 500 | Miami, FL 33131  
[REDACTED] | [Jeffrey.chang@ibvenergy.com](mailto:Jeffrey.chang@ibvenergy.com)

**Home Office:** Raleigh, NC

**CASE No. 2021-00127**  
**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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14. The north central part of the project site may be within the Protection Zone of the Cecilia Gas Storage Field (about 1.5 miles from injection wells) that belongs to the city of Elizabethtown, Kentucky. Confirm whether it is. Detail any conversations with the Energy and Environment Cabinet's Division of Oil and Gas, the city of Elizabethtown Gas Department, or ANSGeo, author of the Final Geotechnical Study (Attachment 14 of the SAR), regarding whether there are any limitations to boring or pile driving within the Project boundary due to proximity to the gas storage field.

**Response: To date, no conversations have been had with the Energy and Environment Cabinet, the City of Elizabethtown, or ANSGeo regarding the Protection Zone of the Cecilia Gas Storage Field. Moving forward, the Rhudes Creek Solar team will commence coordination with the aforementioned parties to determine the limitations on boring and pile driving in proximity to the gas storage field.**

**Witness: Jeff Chang, Planning & Engineering Manager**

**CASE No. 2021-00127**  
**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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15. Louisville Gas & Electric Company serves the area with natural gas. Detail any conversations with it concerning whether there are any underground distribution lines bordering or on the Project site.

**Response: To date, no conversations have been had with LG&E concerning underground distribution lines in the project's vicinity. Moving forward, the Rhudes Creek Solar team will commence coordination with LG&E to identify and locate any distribution lines bordering or on the Project site.**

**Witness: Jeff Chang, Planning & Engineering Manager**

**CASE No. 2021-00127**  
**RHUDES CREEK SOLAR, LLC**  
**RESPONSES TO SITING BOARD'S SECOND REQUEST FOR INFORMATION**

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16. The site is primarily in the Nolin RECC electric service area. However, the eastern part is in Kentucky Utility territory. Confirm this fact. If it is correct, explain how Rhudes Creek Solar will abide by these electric service area boundaries for electric service.

**Response: At this time, Rhudes Creek Solar does not anticipate needing retail electric service. To the extent that retail electric service is needed for a maintenance building or other facility, the project will receive service from the appropriate electrical service provider based on the location of that building and the utilities' certified territories.**

**Witness: Alexander Gregory – Sr. Manager EPC**

**COMMONWEALTH OF KENTUCKY  
BEFORE THE KENTUCKY STATE BOARD  
ON ELECTRIC GENERATION AND TRANSMISSION SITING**

**ELECTRONIC APPLICATION OF RHUDES )  
CREEK SOLAR, LLC FOR A CERTIFICATE OF )  
CONSTRUCTION FOR AN APPROXIMATELY )  
100 MEGAWATT MERCHANT ELECTRIC ) Case No. 2021-00127  
SOLAR GENERATING FACILITY AND A )  
RELATED 138 KV NONREGULATED ELECTRIC )  
TRANSMISSION LINE APPROXIMATELY 1 ½ )  
MILES IN LENGTH IN HARDIN COUNTY, )  
KENTUCKY PURSUANT TO KRS )  
278.700 AND 807 KAR 5:110 )**


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**CERTIFICATION**

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This is to certify that I have supervised the preparation of Rhudes Creek Solar, LLC' s responses to the Siting Board Staff's Second Request for Information and that the responses are true and accurate to the best of my knowledge, information, and belief after reasonable inquiry.

Date: 12/7/2021

  
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Timothy Kim